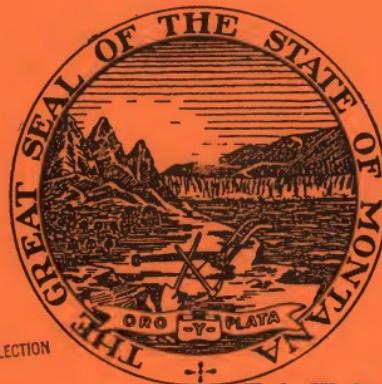


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STANDARD DRAWINGS

1979 EDITION



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SUPPLEMENTAL

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STANDARD SPECIFICATIONS

FOR

ROAD AND BRIDGE CONSTRUCTION

MONTANA
DEPARTMENT OF HIGHWAYS

MONTANA STATE LIBRARY



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DEPARTMENT OF HIGHWAYS
HELENA, MONTANA 59601

STANDARD DRAWINGS FOR HIGHWAY CONSTRUCTION

These Standard Drawings which are supplementary to the Standard Specifications become effective June 1, 1979.

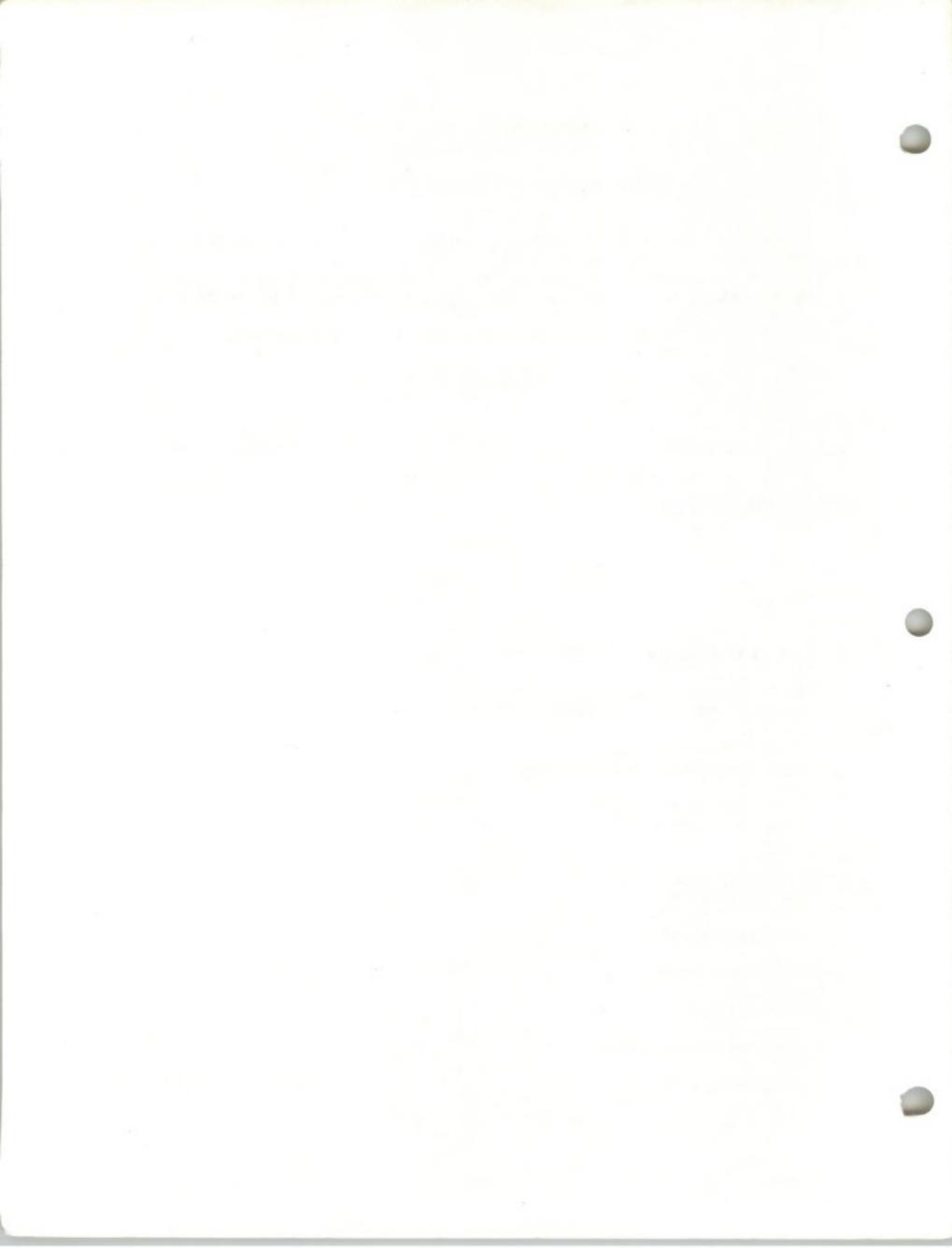
In the future when revised drawings are sent, they will become effective on the date shown thereon and the superseded drawings should be retained until no longer applicable.

New drawings issued will become effective on the date shown thereon.

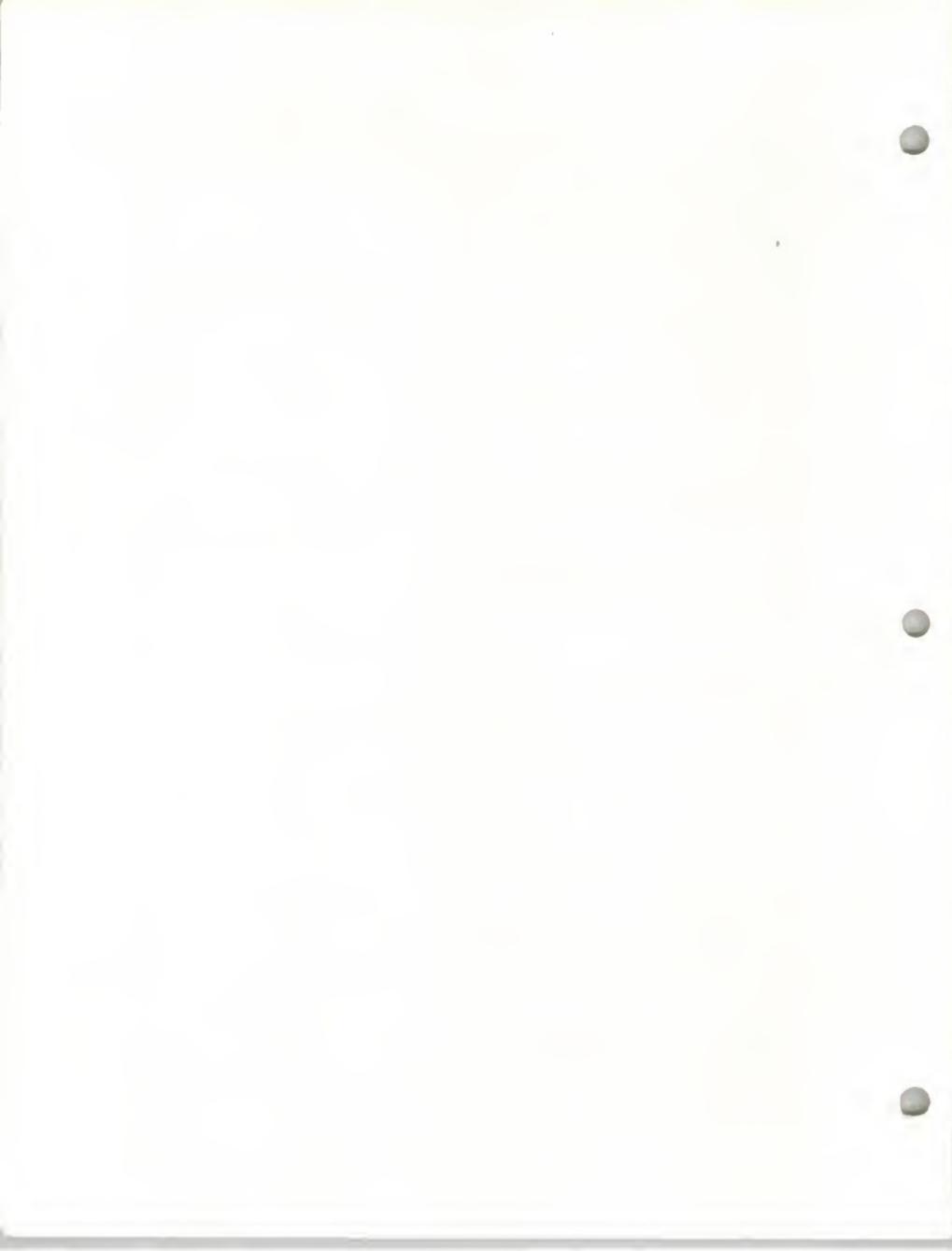
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WU 90-10470



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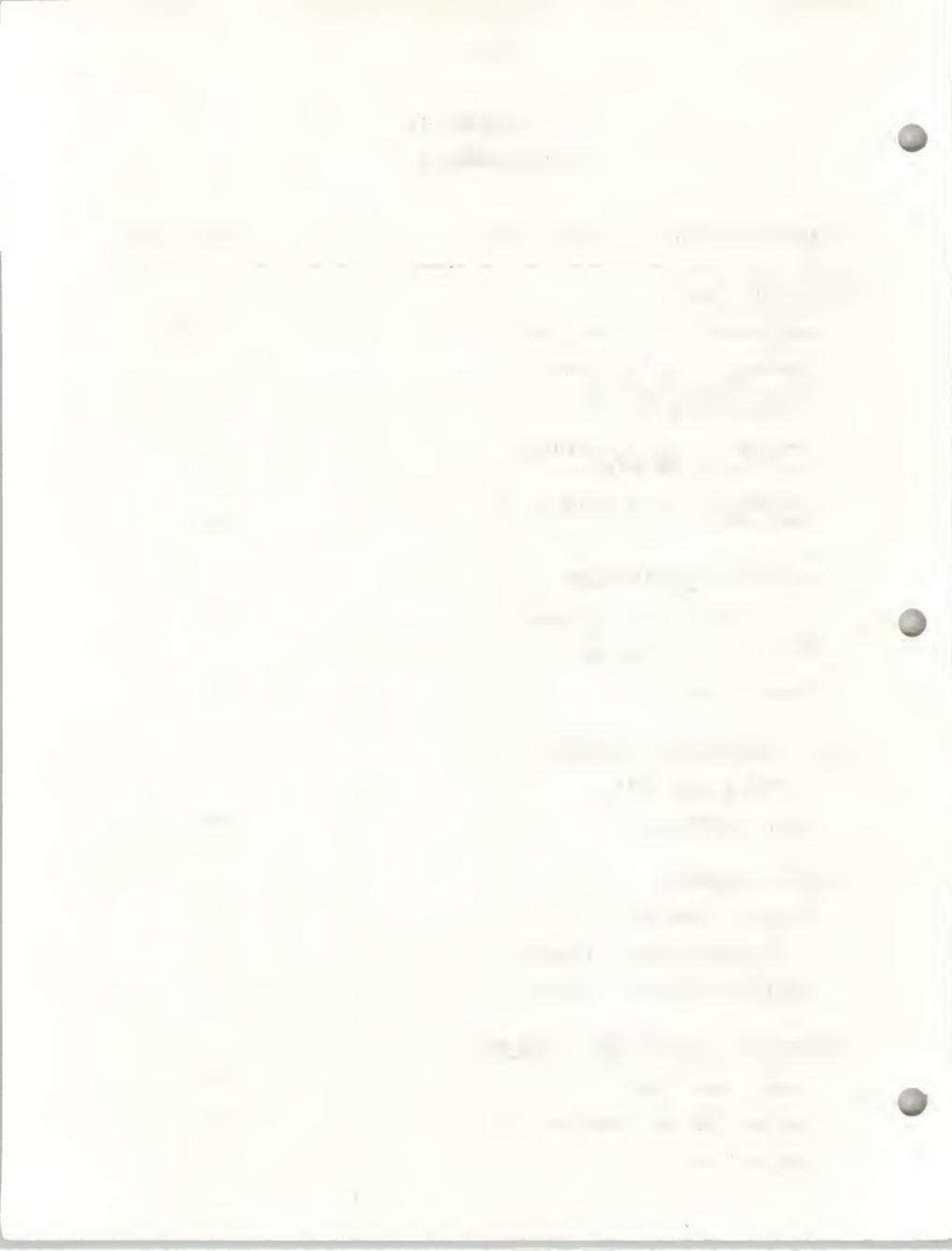


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SYMBOLS & ABBREVIATIONS

TITLE: SWEET

Primary route on 20 km site. All others on 50 km site

PROFILE

PROFILE

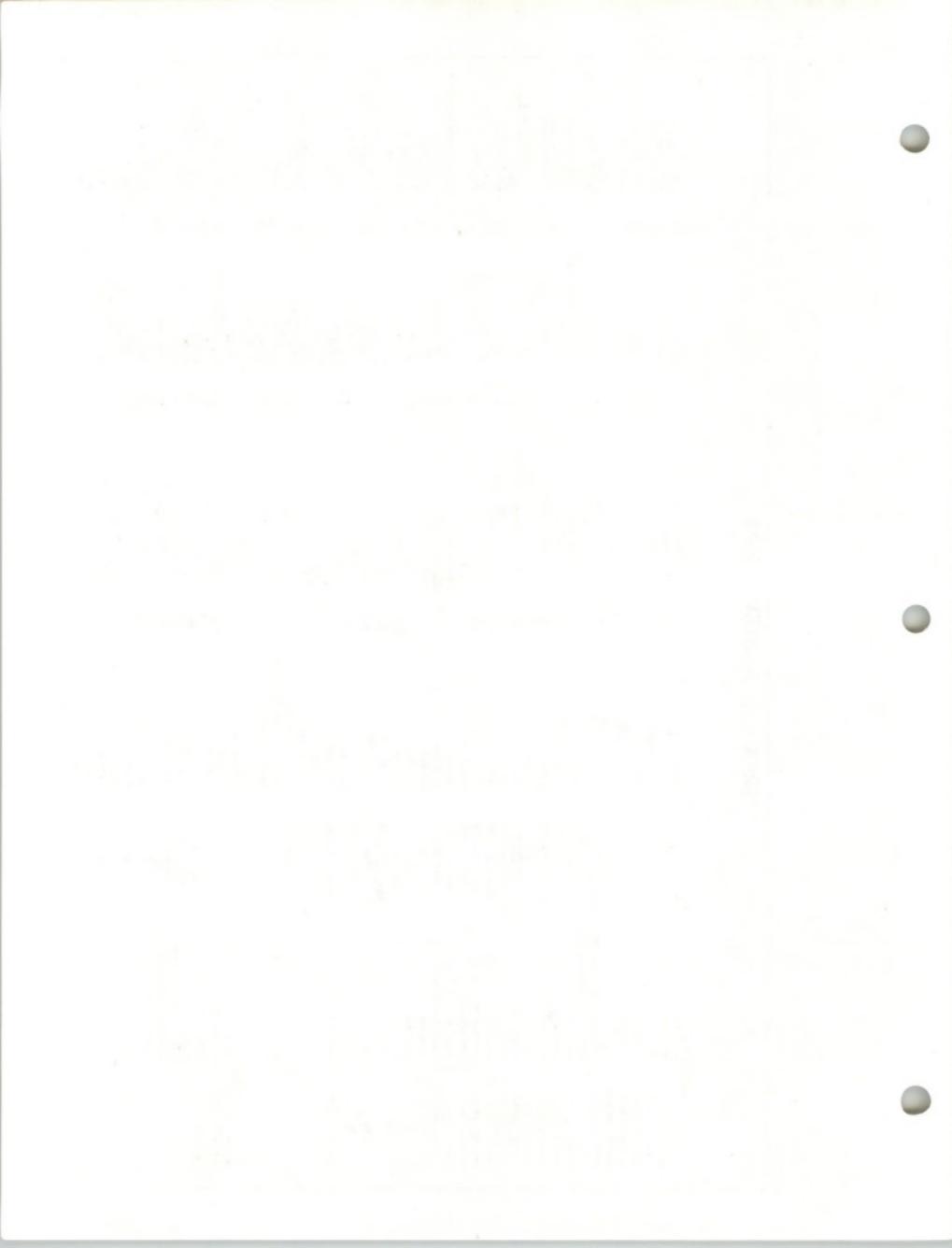
FLOWLINE AT % CULVERT
FLOWLINE AT % IRRIGATION SYPHON
FLOWLINE AT % CONCRETE BOX CULVERT

CROSS SECTIONS

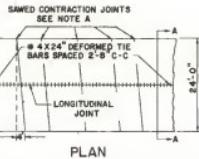
POWER POLE (No. of Wires & Voltage)
TELEPHONE POLE (No. of Wires)
TELEGRAPH POLE (No. of Wires)
GUY POLE

--- NO ---	NATURAL GAS LINE
--- GAS OR OIL ---	GASOLINE OR OIL LINE
○	TELEGRAPH POLE
●	TELEPHONE POLE
■	POWER POLE
◆	TROLLEY POLE
★	LIGHT POLE
◆	GUY POLE
○	GUY WIRE & ANCHOR
→	

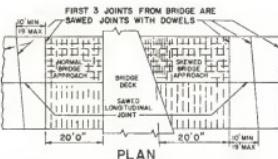
附录



8" X 24" PLAIN P.C. CONCRETE PAVEMENT



NOTE C:
CONTRACTION JOINTS SHALL BE CONSTRUCTED AT LEAST 3' FROM ANY CONSTRUCTION JOINT (STD. DWG. 47)

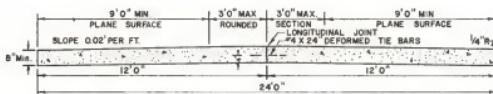


NOTE A: CONTRACTION JOINTS SHALL BE SAWED DIAGONALLY AS SHOWN ABOVE UNLESS SHOWN OTHERWISE ON THE PLANS.

OFFSET = 4" IN 24" AND SKEWED COUNTERCLOCKWISE TO THE DIRECTION OF TRAFFIC MOVEMENT.

SPACING OF THE JOINTS SHALL BE 13', 19', 16', 12' AND REPEAT EXCEPT FOR THE FIRST JOINT AT BRIDGE APPROACH PANELS OR EXPANSION JOINT LAYOUT.

SAWED JOINT DETAIL FOR BRIDGE APPROACH PANELS
NOTE B: THE 10' MIN AND 19' MAX DIMENSIONS SHOWN ABOVE ARE ALSO APPLICABLE FOR THE FIRST CONTRACTION JOINT ON EITHER SIDE OF AND EXPANSION JOINT LAYOUT.

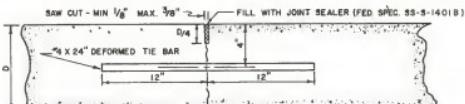


FOR CONTRACTION JOINT DETAIL

FOR LOCATION AND DETAILS OF DOWELED CONTRACTION JOINTS

DEFORMED TIE BARS TO BE INCLUDED IN UNIT PRICE BID FOR P.C. CONCRETE PAVEMENT.

SAWED LONGITUDINAL JOINT WITH DEFORMED TIE BARS



TIE BARS MAY BE INSTALLED AFTER THE CONCRETE HAS BEEN STRUCK OFF AND PRIOR TO FINAL FINISHING, OR IN INSTALLING DEVICE PREVIOUSLY APPROVED BY THE ENGINEER, WHICH WILL PLACE THE TIE BARS IN THE REQUIRED POSITIONS AND LOCATION.

THE BARS PLACED IN ADVANCE OF CONCRETE PLACING OPERATIONS SHALL BE RIDGELY AND SECURELY SUPPORTED IN THE REQUIRED POSITION AT THE JOINT BY CHAIRS, STAKES AND OR SUPPORTING DEVICES. THE SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED BY THE CONTRACTOR AND FURNISHED THE ENGINEER WITH THE CONCRETE. THE USE OF THESE DEVICES AT A CONVENTIONAL TIME OF CONSTRUCTION FOR HIS APPROVAL, ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE AND FINAL APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE.

SEE STANDARD SPECIFICATIONS ARTICLE 39.04 (K) (4) FOR SAWED JOINT.

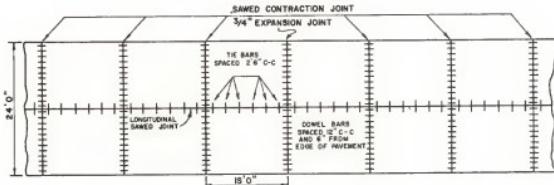
THE COST OF THE TIE BARS, JOINT SEALER, AND SUPPORTING DEVICES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR SQUARE YARD OF P.C. CONCRETE PAVEMENT.

NOTE: THIS JOINT MAY BE USED AT OTHER LOCATIONS IF CALLED FOR ON THE PLANS.

STANDARD DRAWING		DWG. NO. 15
REFERENCE, STANDARD SPEC. SECTION 39	P.C. CONCRETE PAVEMENT SAWED JOINTS WITH TIE BARS	APPROVED By Jacob R. Rehert
REVISED EFFECTIVE 3/1/72	12/20/74 4/1/79 2/11/75 6/1/79	ADMINISTRATOR-ENGINEERING DIVISION

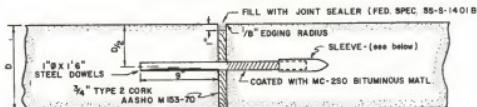


EXPANSION JOINT LAYOUT



3/4" EXPANSION JOINT TO BE FILLED WITH TYPE 2 CORK AND JOINT SEALER. SMOOTH STEEL DOWELS WITH SLEEVES IN CONCRETE. SMOOTH STEEL DOWELS WITH SLEEVES SHALL BE COATED WITH MC-250 BITUMINOUS MATERIAL FOR ONE-HALF THE LENGTH OF THE DOWEL INSTALLED IN SAWED CONTRACTION JOINT, THE FIRST THREE CONTRACTION JOINTS EACH SIDE OF EXPANSION JOINT.

EXPANSION JOINT



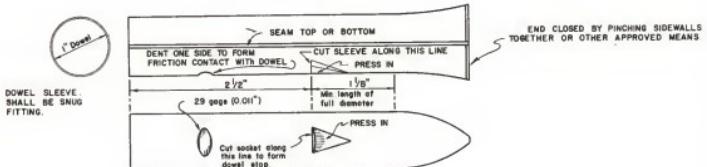
DOWELS SPACED 12" C-C BEGINNING 6" FROM OUTER EDGES OF PAVEMENT.
DOWELS TO BE PROVIDED WITH DOWEL SLEEVES

ONE-HALF THE LENGTH OF THE DOWEL, ON WHICH THE SLEEVE IS PLACED SHALL BE THOROUGHLY COATED WITH MC-250 BITUMINOUS MATERIAL OR HEAVY GREASE. SLEEVES TO BE PLACED ON ALTERNATE ENDS OF DOWEL BARS.

THE TYPE 2 CORK EXPANSION JOINT FILLER, AASHO M 153-70 SHALL CONFORM TO THE DIMENSIONS SHOWN AND CUT TO FIT THE CROWN AND SUBGRADE.

THE CONTRACTIONS SHALL BE FIRMED, CHAIRED, STAKED, AND/OR SUPPORTING DEVICES CAPABLE OF HOLDING THE DOWELS AND JOINT FILLER SECURELY AND RIGIDLY, IN THEIR REQUIRED POSITIONS. THE DOWEL AND JOINT FILLER SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH DETAIL DRAWINGS OF THESE DEVICES AND SUBMIT THEM IN ADVANCE OF CONSTRUCTION, FOR HIS APPROVAL. ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE, AND FINAL APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE.

DOWEL SLEEVE FOR 1" DOWEL BARS

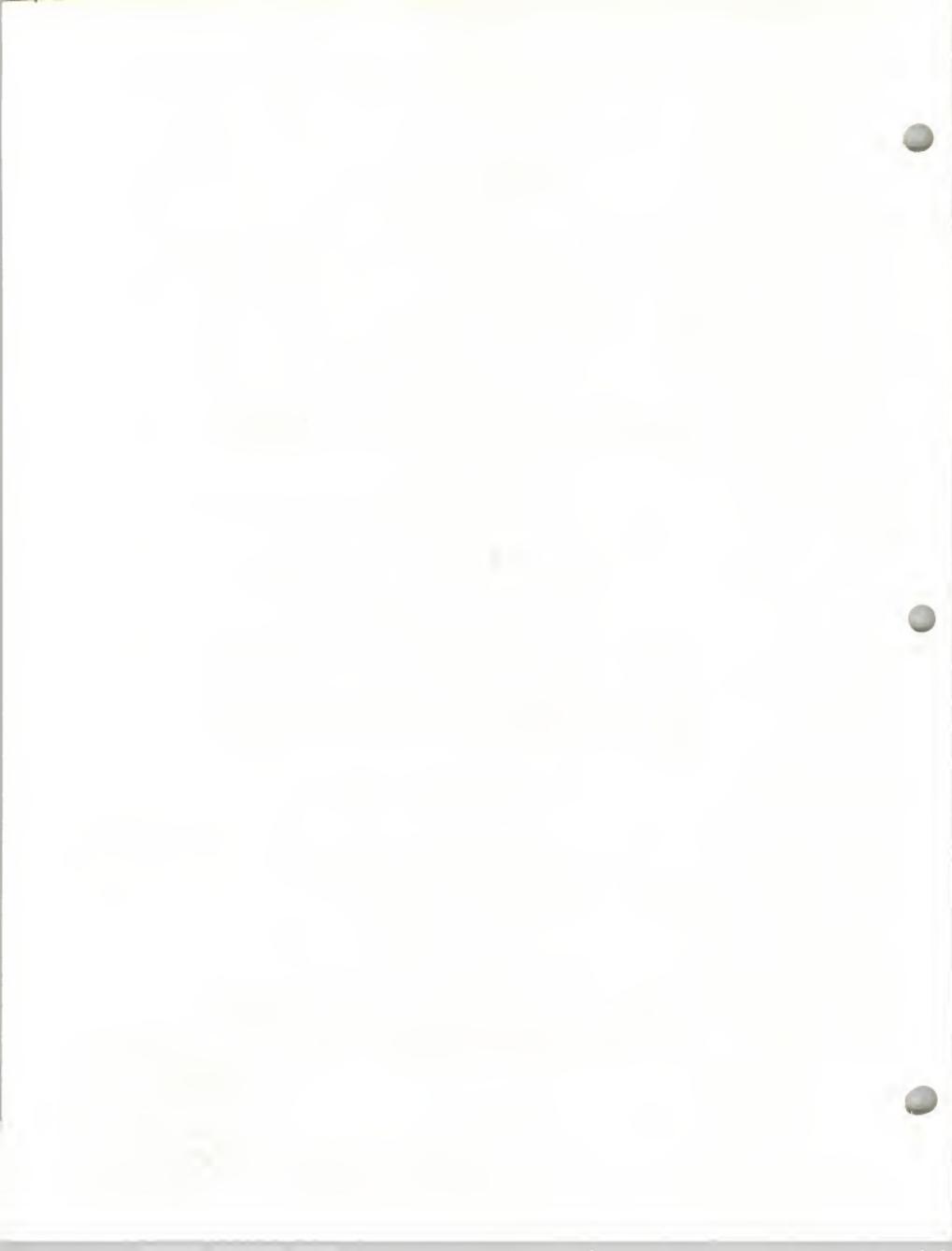


SLEEVES TO BE PLACED ON ALTERNATE OPPOSITE ENDS OF DOWELS. HALF THE LENGTH OF THE DOWEL, ON THE END ON WHICH THE SLEEVE IS PLACED, SHALL BE THOROUGHLY COATED WITH MC-250 BITUMINOUS MATERIAL OR HEAVY GREASE TO BREAK THE BOND.

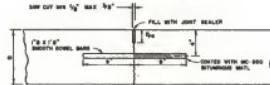
DOWELS, DOWEL SLEEVES, JOINT FILLER MC-250 AND SEALER, TOGETHER WITH THE SUPPORTING DEVICES NECESSARY FOR THE PROPER INSTALLATION OF THE JOINT, SHALL BE INCLUDED IN THE UNIT PRICE BIG PER SQUARE YARD FOR PC CONCRETE PAVEMENT.

STANDARD DRAWING

REFERENCE	DWG. NO.
STANDARD SPEC.	16
SECTION 39	
P.C. CONCRETE PAVEMENT	
REVISED	4/1/79
EFFECTIVE	3/1/72 6/1/79
APPROVED <i>Mark R. Bond</i> ADMINISTRATOR-ENGINEERING DIVISION	



SAWED JOINT WITH DOWEL BARS

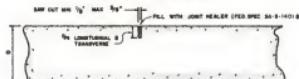


ONE-HALF LENGTH OF THE BOWLS, BASES OR ALTERNATE EDGES SHALL BE THOROUGHLY COATED WITH

THE CONTRACTOR SHALL FURNISH CHAIRS, STAIRS AND/OR SUPPORTIVE DEVICES CAPABLE OF HELDING THE SCAFFOLDS SECURELY AND FIRMLY, IN THEIR RESPECTIVE POSITIONS. THE SCAFFOLD SUPPORTIVE DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINNEER WITH METAL DRAWINGS OF THESE DEVICES APPROXIMATELY TWO (2) MONTHS OF CONSTRUCTION, FOR HIS APPROVAL. ANY APPROVAL OR DRAWINGS OF THESE DEVICES WHICH HE CONSIDERS TENTATIVE AND FINAL APPROVAL, SHALL BE CONTINGENT UPON THEIR SATISFACTORIAL PERFORMANCE.

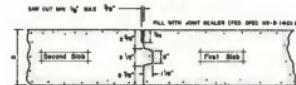
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SAWN CONTRACTION JOINT



SEE STANDARD SPECIFICATION, ARTICLE 39.04(1)(4) FOR SHALLOW CONTRACTION JOINT DETAILS.
WHERE INTERNAL CURB IS CALLED FOR, THE JOINT SHALL BE CONTINUOUS THROUGH THE INTERNAL
CURB.

LONGITUDINAL KEYWAY JOINT



BETWEEN JOINTS (1 1/8" X 8") MAY BE FORMED WITH WOOD STRIP OR APPROVED METAL FORM. KEYHOLES
FORMS SHALL BE CLEANED AND OILED EACH TIME THEY ARE USED.

6. LONGITUDINAL KEYWAY JOINT WITH TIE RODS



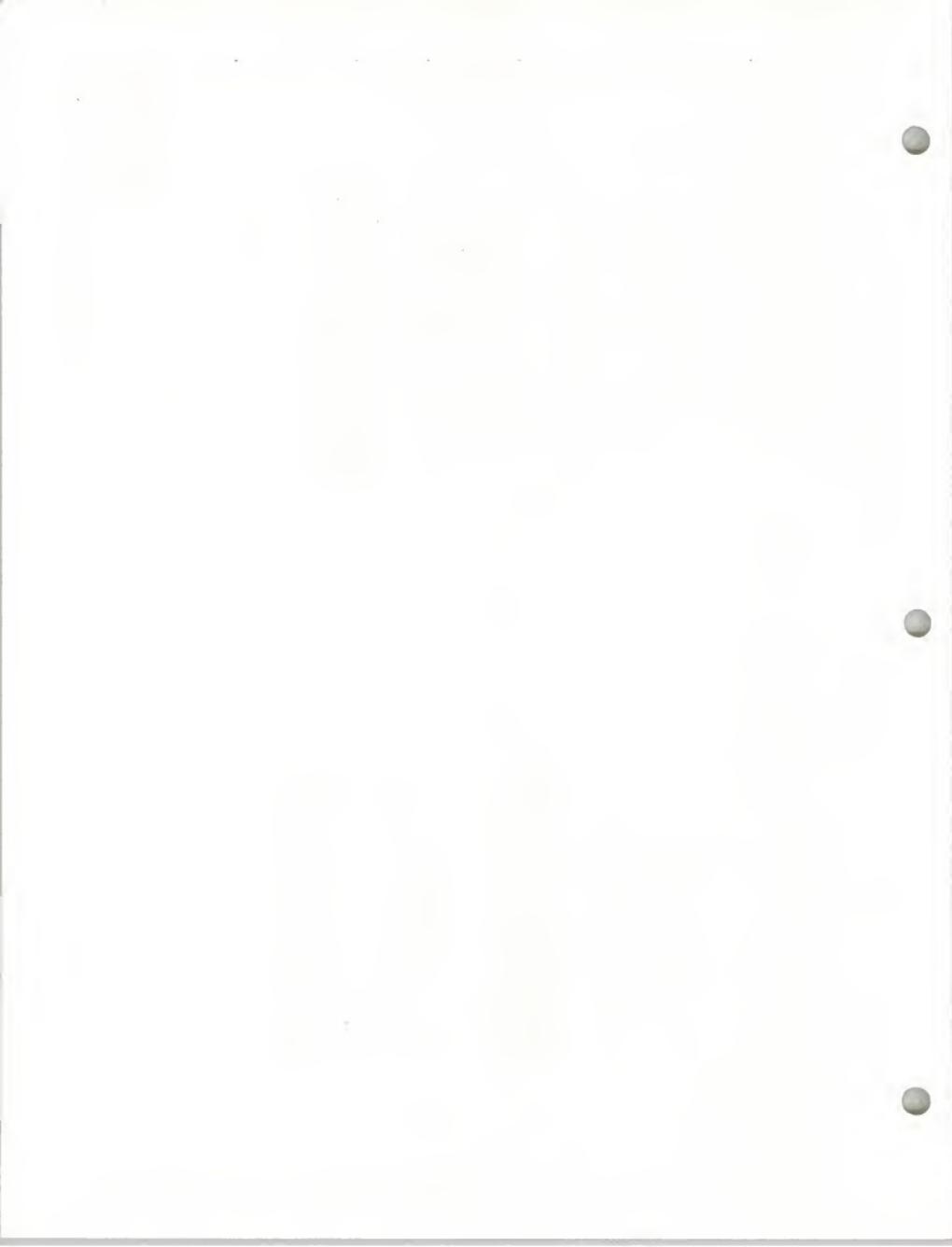
MAINTENANCE SPECIFICATIONS FOR THE SAAB ETC-6.

LONGITUDINAL HYDRAULIC JOISTS SHALL BE USED WHEN PAVEMENT IS CONSTRUCTED IN SIMPLE ALTERNATE LAMING AND WHEN DEFLECTIONS ARE NOT CALL FOR ON THE PLANS.

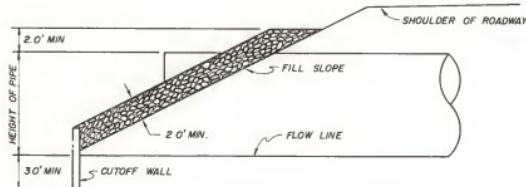
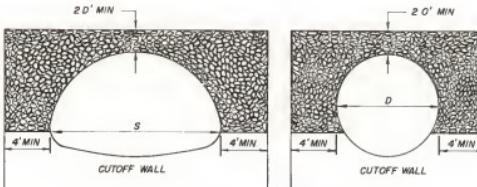
DEMAND THAT THE CONTRACTOR SHALL MAINTAIN AND REPAIR ALL THE REMOVED PORTIONS OF THE EXISTING PAVEMENT AND THAT HE SHALL REPAIR ALL THE PAVEMENT REMOVED AS A RESULT OF THE REMOVAL OF THESE DEVICES. A SUFFICIENT TIME IN ADVANCE OF THE DATE OF REMOVAL OF THESE DEVICES, THE CONTRACTOR SHALL BE ADVISED OF THE DATE OF REMOVAL OF THESE DEVICES, AND APPROPRIATE ARRANGEMENTS SHALL BE MADE UPON THEIR SATISFACTORIES PERFORMANCE. JOINTS MAY BE USED AT ANY LOCATION CALLED FOR.

DETERMINE THE BASE, JOINT MATERIALS AND SUPPORTING SERVICES NEEDED TO BE INCLUDED IN THE UNIT PRICE PER LINEAR METRE FOR P.C. CONCRETE PAVEMENT.

STANDARD DRAWING			
REFERENCE:	DWS. NO.		
STANDARD SPEC.	LT		
SECTION 2B			
PC. CONCRETE PAVEMENT SIGNED AND KEYWAY JOINTS			
REVISIED	8/1/04	4/2/04	EXHIBIT B
EXECUTIVE			

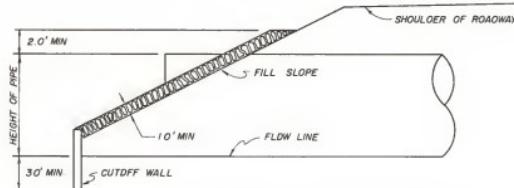
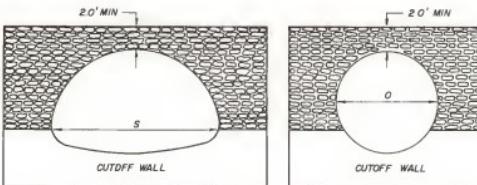


RANDOM RIPRAP



SEE SPECIFICATIONS FOR GRADATION, TYPES AND CONSTRUCTION METHODS.

HAND LAID RIPRAP



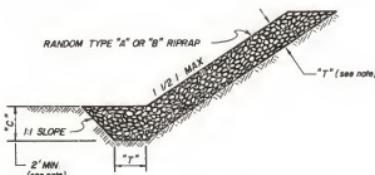
ENDS OF RIPRAP WALLS SHALL BE KEYED INTO THE EMBANKMENT SLOPES A MINIMUM OF 2 FEET FROM OUTER FACE OF THE RIPRAP FOR THE FULL HEIGHT OF THE RIPRAP WALL.

SEE SPECIFICATION FOR GRADATION AND CONSTRUCTION METHOD.

STANDARD DRAWING	
REFERENCE:	DWG. NO. 25
STANDARD SPEC.	
SECTION 50	
CULVERT RIPRAP	
REVISED	APPROVED
EFFECTIVE	J 1 / 72
By <i>Jack D. Babbitt</i> ADMINISTRATOR - ENGINEERING DIVISION	



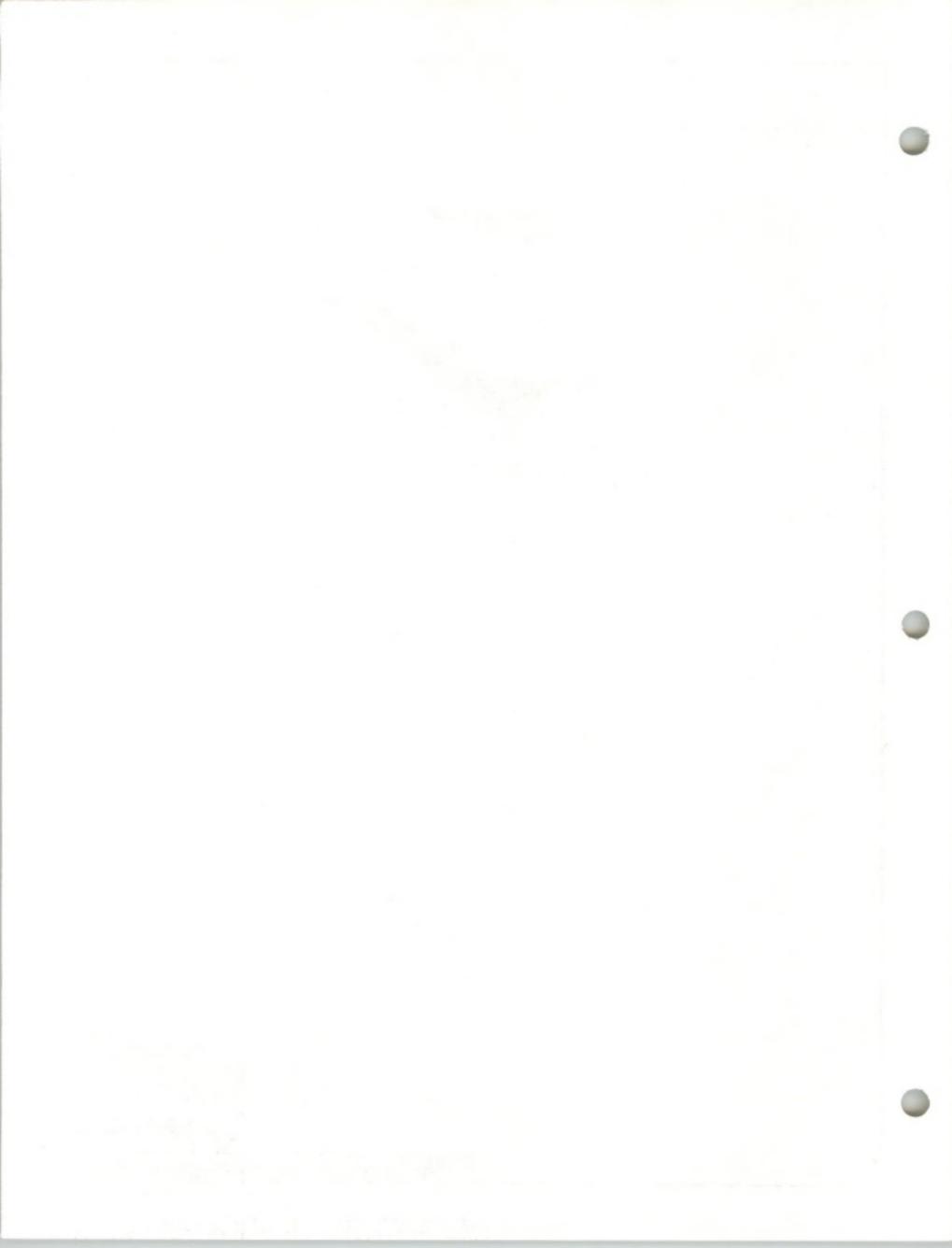
EMBANKMENT PROTECTION

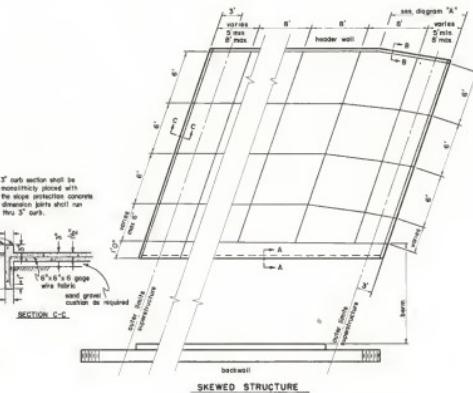
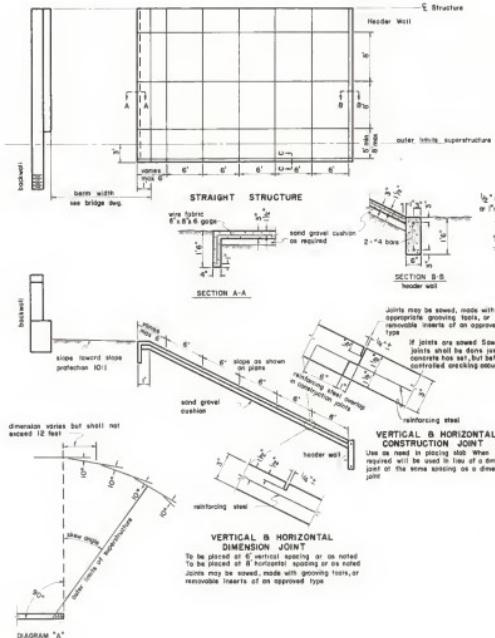


"T" SHALL BE 1.5' MINIMUM UNLESS OTHERWISE SPECIFIED ON PLANS.

"C" SHALL BE 2.0' MINIMUM UNLESS OTHERWISE SPECIFIED FOR MORE PROTECTION DUE TO SCOUR.

STANDARD DRAWING	
REFERENCE STANDARD SPEC. SECTION 50	DWG. NO. 26
EMBANKMENT PROTECTION	
REVISED EFFECTIVE 3/1/72	APPROVED <i>R. D. Roberts</i> ADMINISTRATOR - ENGINEERING DIVISION





CAST-IN-PLACE CONCRETE

SHOT-PEENED CONCRETE
Locate joints as indicated on the plans. If construction is stopped for over two hours a construction joint shall be made. Payment shall be the same as for concrete blocks. Class "D" concrete shall be used for all shot-peened concrete.

An approved one half inch expansion joint filler should be used wherever the cast in place concrete abuts against any part of the bridge structure.

http://www.iomega.com/zipdrive/zip100.html

The embankment slope shall be cleared of all brush, debris and rubble. A cushion is required for dirt embankment slopes. A cushion is not required for gravelly embankment slopes. All slopes shall be finished to a reasonably uniform surface or to the slope indicated in the bridge plans. All loose material shall be compacted to the satisfaction of the engineer. Adjacent slope areas shall be left in a smooth, uniform condition.

REINFORCING STEEL
(May use either alternate listed below)
3 bars at 6'10" centers (horiz & vert spacing)

min cover of 1 inch

E Welded wire fencing 8 x 6 x 10 gauge

Six inch gap required at construction joints if possible.

卷之三

STANDARDS OF PRACTICE

REFERENCE STANDARD SPEC.

scroll to

REVISED 6/10/72 EE-100 APPROVED
EFFECTIVE 3/1/72 EE-100 6/1/72 EE-100
SUPERVISOR
ADMINISTRATOR - ENRICHMENT DIVISION



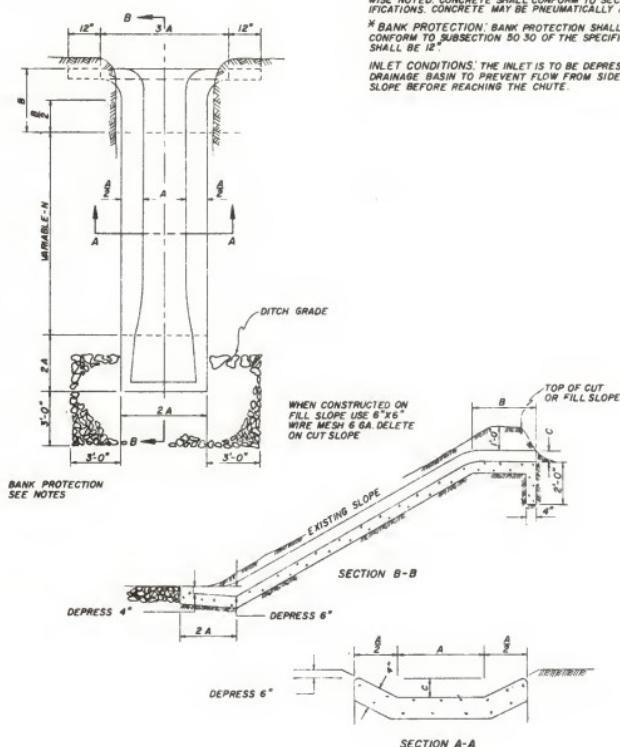
NOTES

SPECIFICATIONS: MONTANA DEPARTMENT OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, ADOPTED OCTOBER 1, 1970 AND ANY AMENDMENTS THERETO, AND SPECIAL PROVISIONS SHALL GOVERN UNLESS OTHERWISE NOTED.

CONCRETE: ALL CONCRETE SHALL BE CLASS AC-DC UNLESS OTHERWISE NOTED. CONCRETE SHALL CONFORM TO SECTION 40 OF THE SPECIFICATIONS. CONCRETE MAY BE PNEUMATICALLY APPLIED.

* BANK PROTECTION: BANK PROTECTION SHALL BE TYPE 4 AND SHALL CONFORM TO SUBSECTION 50.30 OF THE SPECIFICATIONS. THICKNESS SHALL BE 12".

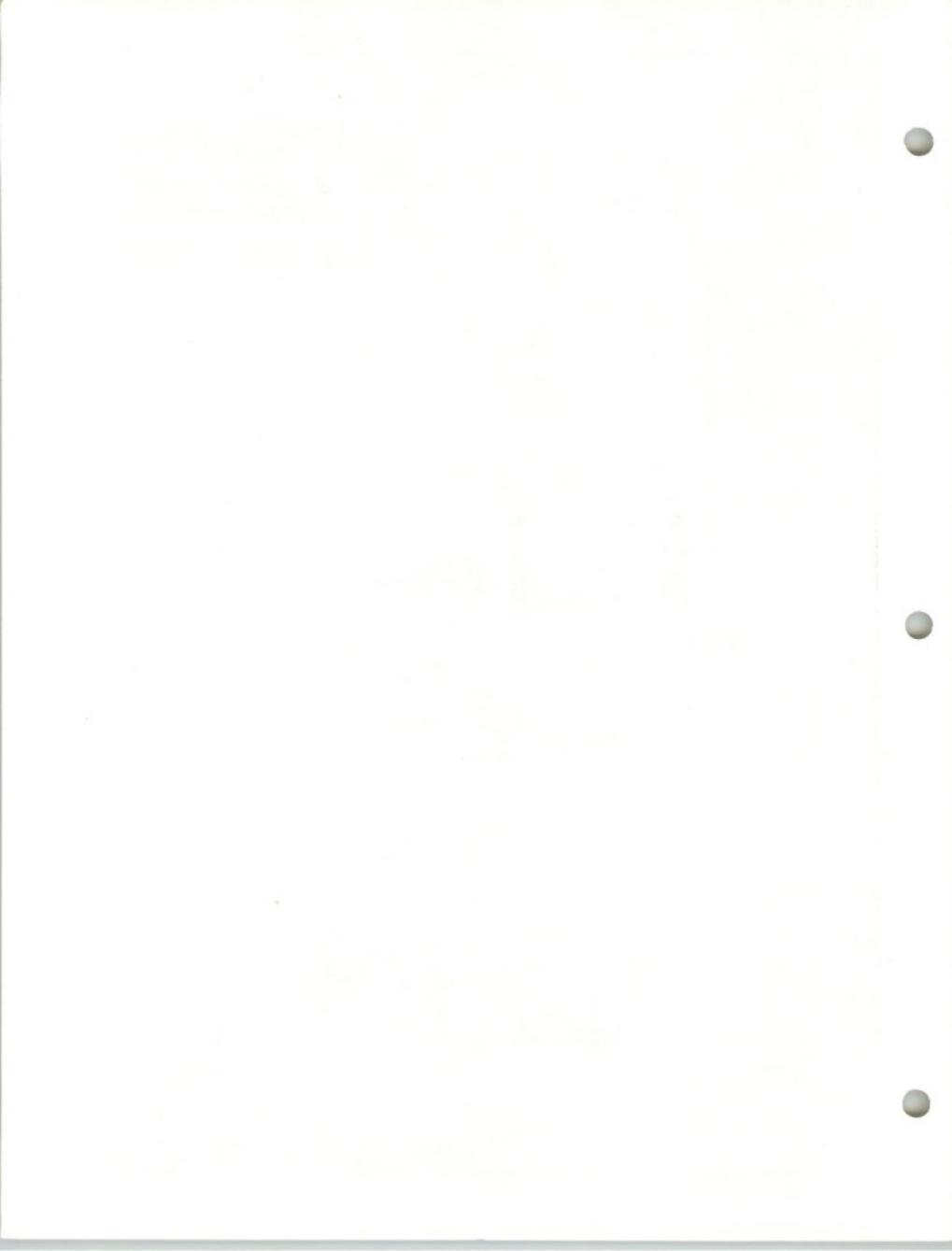
INLET CONDITIONS: THE INLET IS TO BE DEPRESSED BELOW THE NATURAL DRAINAGE BASIN TO PREVENT FLOW FROM SIDE CHANNELING OVER THE SLOPE BEFORE REACHING THE CHUTE.

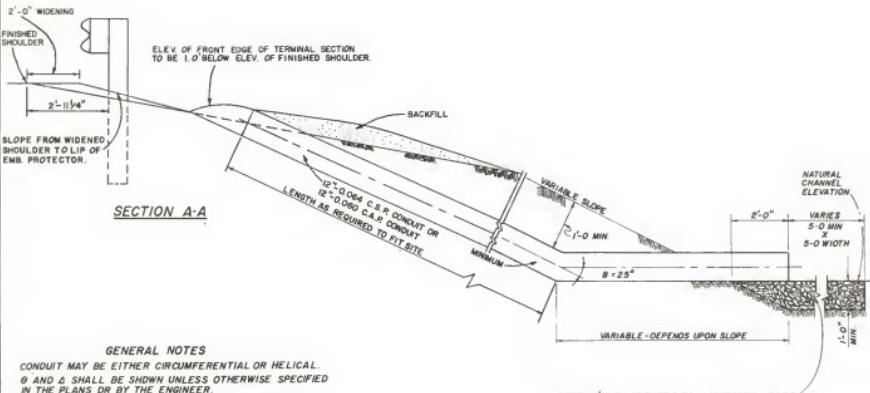
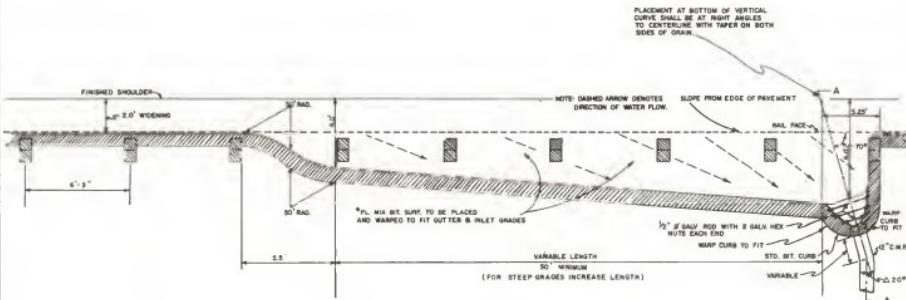


DIMENSIONS			QUANTITIES
A	B	C	CONCRETE CU.YD.
2-0	4-0	0-4	0.7 CU.YD. + NX .051 CU.YD./LIN.FT.
2-0	4-0	1-0	0.9 CU.YD. + NX .056 CU.YD./LIN.FT.
4-0	8-0	1-0	2.2 CU.YD. + NX 105 CU.YD./LIN.FT.
4-0	8-0	1-6	2.3 CU.YD. + NX 111 CU.YD./LIN.FT.

* EXCAVATION AND BANK PROTECTION TO BE INCLUDED IN THE UNIT PRICE BID FOR CONCRETE.

STANDARD DRAWING	
REFERENCE	DWG NO.
STANDARD SPEC.	28
SECTION 50	
CONCRETE DRAINAGE	
CHUTE	
APPROVED	Jack R. Robert
EFFECTIVE	3/1/72
ADMINISTRATOR - ENGINEERING DIVISION	



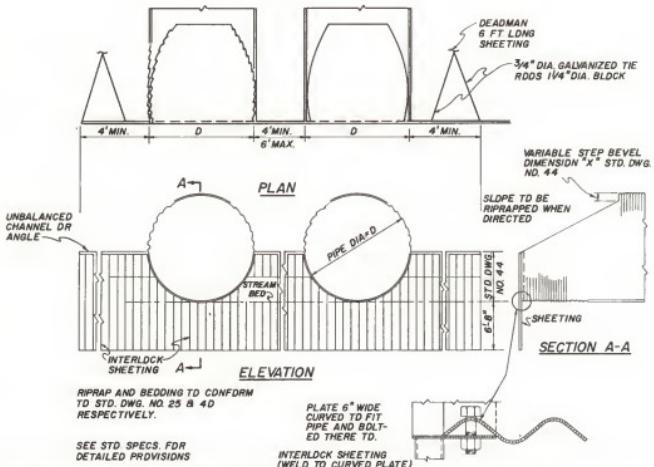


OUTLET: DETAIL

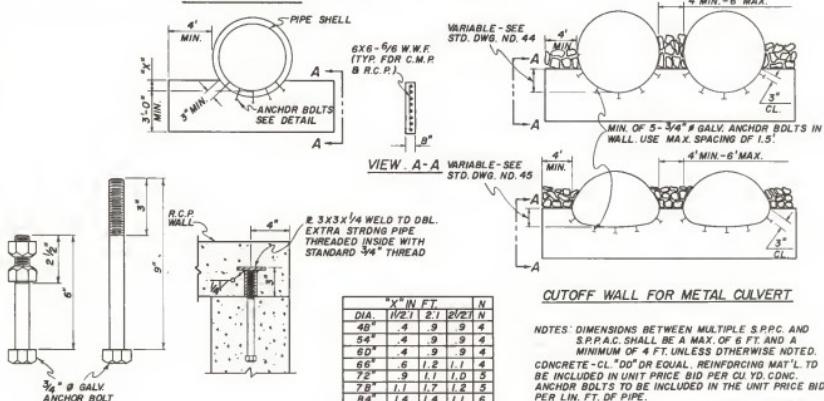
STANDARD DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	29
SECTION 56	
EMBANKMENT PROTECTOR	
REVISED	4/1/79
EFFECTIVE	3/1/72 6/1/79
APPROVED	R. Bondurant
	ADMINISTRATOR-ENGINEERING DIVISION



METAL TYPE



CONCRETE TYPE



ANCHOR BOLT DETAILS

ANCHOR BOLT DETAILS

**NOTE: GREASE THREAD TD KEEP
MOISTURE OUT ON CONCRETE
INSTALLATION ONLY.**

"X" IN FT.			N
DIA.	1/21	21	2/21
48"	.4	.9	.9
54"	.4	.9	.9
60"	.4	.9	.9
66"	.6	1.2	1.1
72"	.9	1.1	1.0
78"	1.1	1.7	1.2
84"	1.4	1.4	1.1

CUTOFF WALL FOR METAL CULVERT

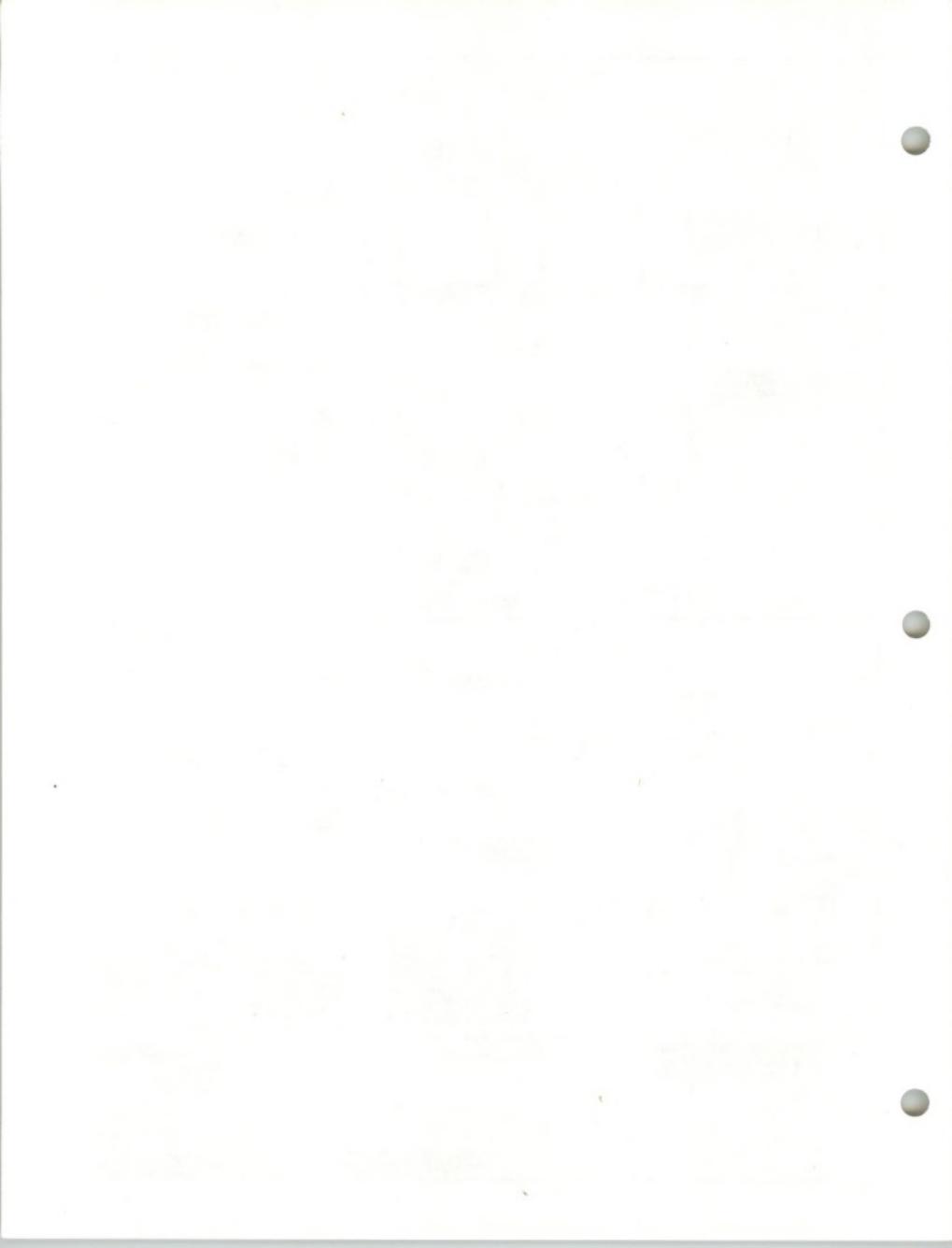
NOTES: DIMENSIONS BETWEEN MULTIPLE S.P.P.C. AND S.P.P.C. SHALL BE A MAX. OF 6 FT. AND A MINIMUM OF 4 FT. UNLESS OTHERWISE NOTED.
CONCRETE - CL "DO" OR EQUIVALENT, REINFORCING MAT'LL TO BE INCLUDED IN UNIT PRICE BID PER CY YD. CONC., ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. OF PIPE.
SEE STD. DWG. NO. 4D 8 4I FDR BACKFILL UNDER CULVERTS.
SEE STD. DWG. NO. 25 FDR PURRAS.

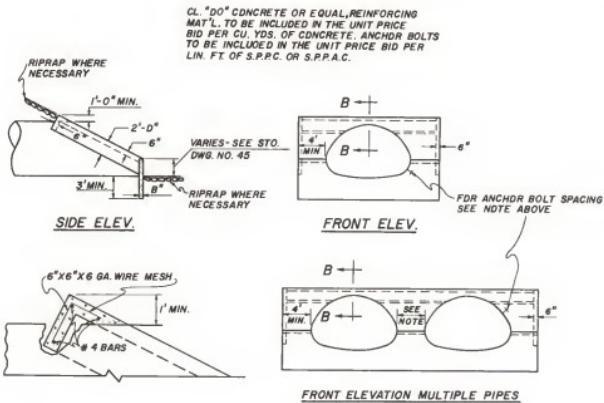
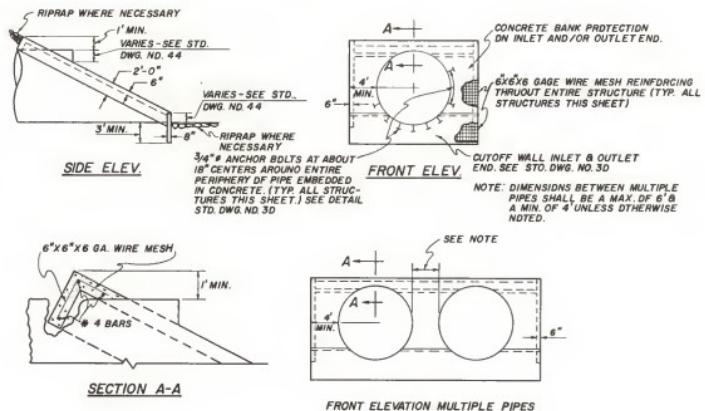
STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 30
SECTION 73

CUTOFF WALLS FOR CULVERTS

APPROVED
BY *L. R. Rabat*
ADMINISTRATOR-ENGINEERING DIVISION

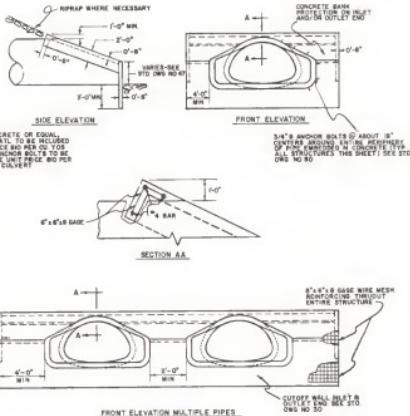




STANDARD DRAWING	
REFERENCE:	DWG. NO. 31
STANDARDS SPEC.	
SECTION 73	
CONCRETE EDGE PROTECTION FOR STRUCTURAL PLATE PIPE CULVERT & FOR STRUCTURAL PLATE PIPE ARCH CULVERT	
REVISED	EFFECTIVE
3/1/72	
APPROVED <i>Donald R. Bush</i>	
ADMINISTRATOR - ENGINEERING DIVISION	



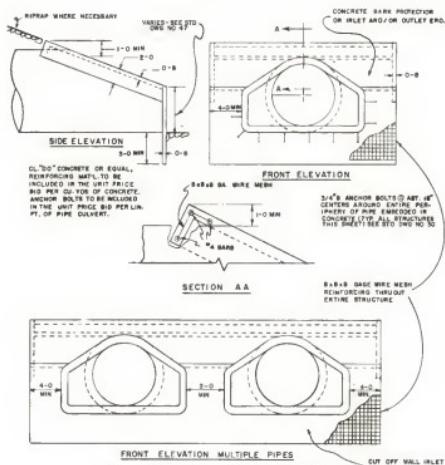
ARCH CULVERT



Size	Single Pipe			Dual Pipe		
	# of ft wire reinforcing # of ft wire # of ft concrete	# of ft wire reinforcing # of ft wire # of ft concrete	# of ft wire reinforcing # of ft wire # of ft concrete	# of ft wire reinforcing # of ft wire # of ft concrete	# of ft wire reinforcing # of ft wire # of ft concrete	# of ft wire reinforcing # of ft wire # of ft concrete
48"	223 478 4.9	331 770 6.7				
54"	232 493 4.7	348 803 7.1				
60"	242 510 5.0	352 840 7.4				
72"	246 575 5.1	382 870 7.6				

W FOR ESTIMATING PURPOSES ONLY
QUANTITIES INCLUDE OUTFALL WALL AND EDGE PROTECTION

PIPE CULVERT

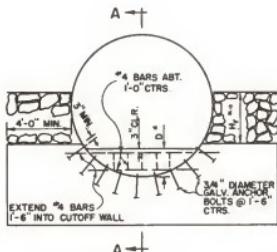


Size	Single Pipe			Dual Pipe		
	# of ft wire reinforcing mesh # of ft concrete					
48"	289 47.5 8.2	388 75.5 7.4				
54"	291 48.0 8.0	345 76.0 7.0				
60"	227 50.6 4.7	316 81.5 6.8				
72"	286 54.0 8.7	348 88.5 7.8				
84"	277 57.5 8.7	403 90.0 8.9				

W FOR ESTIMATING PURPOSES ONLY
QUANTITIES INCLUDE OUTFALL WALL AND EDGE PROTECTION

STANDARD DRAWING		DRAWING NO.
REF ID: 0000000000000000		000
STANDARD SPEC.		SECTION 73
CONCRETE EDGE PROTECTION		FOR CONCRETE CULVERTS
REVISER	REVISER SIGNATURE	DATE
EFFECTIVE	EFFECTIVE SIGNATURE	DATE
ADMINISTRATOR (OPTIONAL FIELD)		





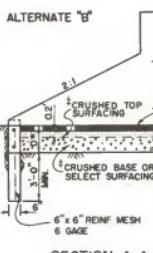
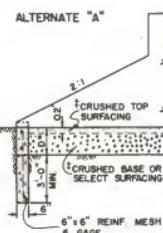
ELEVATION

NOTE: SEE STD. DWG. NO. 30
FOR ANCHOR BOLT DETAILS.

- * H_r = HEIGHT OF RIPRAP (SEE ROAD PLAN)
- + ON THE DESIGN 102, THE BACKFILL MATERIAL SHALL BE CRUSHED TOP SURFACING ONLY.

DIAMETER (inches)	D*
102	0.8'
126	1.2'
162	2.2'
180	2.0'
198	2.6'
210	1.6'

NOTE: CONCRETE SHALL BE CLASS "DD" OR EQUAL.
CONCRETE QUANTITIES ARE FOR ONE END ONLY.
REINFORCING MATERIAL TO BE INCLUDED IN UNIT PRICE BID PER CU YD. CONC.
ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. PIPE.

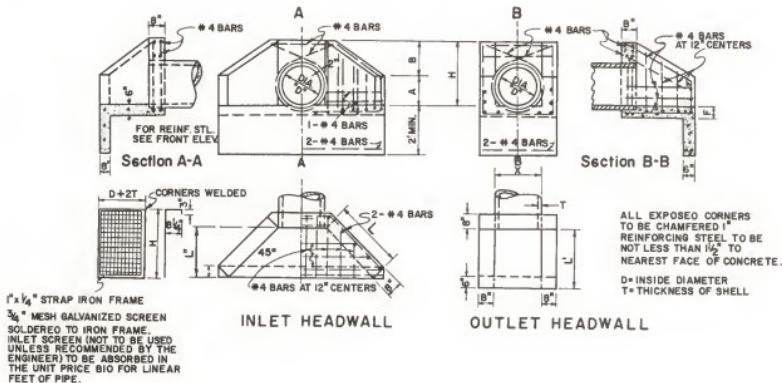


SECTION A-A

DIAMETER (inches)	SURFACING QUANTITIES PER LINEAL FOOT					
	ALTERNATE "A"		ALTERNATE "B"			
	CUBIC YARDS	TON	CUBIC YARD	TONS	BITUM. MATTL.	
	TOP SURF.	CR. BASE OR SEL. SURF.	COVER MAT'L.	PLANT MIX	TOP SURF	CR. BASE OR SEL. SURF.
102	0.100	—	—	—	—	—
126	0.047	0.156	0.0093	0.096	0.045	0.111
162	0.073	0.489	0.0135	0.146	0.069	0.406
180	0.073	0.446	0.0142	0.146	0.071	0.375
198	0.088	0.712	0.0167	0.176	0.084	0.627
210	0.074	0.333	0.0140	0.141	0.067	0.267

STANDARD DRAWING		
REFERENCE: DWG. NO. STANDARD SPEC. 33 SECTION B1		
BACKFILL RETAINER AND CUTOFF WALL FOR VEHICULAR UNDERPASS		
REVISED	EFFECTIVE	APPROVED By <i>Donald H. Robert</i> ADMINISTRATOR-ENGINEERING DIVISION
3/1/72		





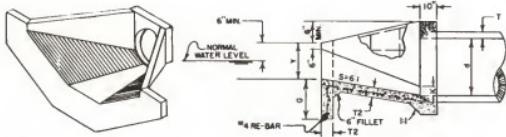
CULVERT	6L" DIA CONC OR EQUAL/CY Vol	REINF. STEEL 1 LB/ cu YD										DIMENSION TABLE				
		IN- LET	OUT- LET	IN- LET	OUT- LET	L	L'	A	B	C	F	L"				
DIA."D"	AREA															
16"	1.77	.60	.60	65	53	2'-6"	2'-2"	1'-3"	1'-3"	1'-11"	6.5"	1'-9"				
24"	3.14	1.00	.86	65	69	3'-0"	2'-6"	1'-6"	1'-6"	2'-6"	7"	2'-1"				
30"	4.91	1.42	1.14	104	65	3'-6"	2'-10"	1'-9"	1'-9"	3'L-1"	7.5"	2'-6"				
36"	7.07	1.64	1.43	126	101	4'-0"	3'-2"	2'-0"	2'-0"	3'-6"	6"	2'-10"				
42"	9.62	2.12	1.73	180	117	4'-6"	3'-6"	2'-3"	2'-3"	4'-3"	6.5"	3'-2"				
46"	12.57	2.34	2.07	175	134	5'-0"	3'-10"	2'-6"	2'-6"	4'-10"	9"	3'-6"				

CULVERT	6L" DIA CONC OR EQUAL/CY Vol	REINF. STEEL 1 LB/ cu YD										DIMENSION TABLE				
		IN- LET	OUT- LET	IN- LET	OUT- LET	L	L'	A	B	H	L"					
DIA."D"	AREA															
16"	1.77	.73	.59	62	50	2'-6"	2'-2"	1'-3"	1'-3"	2'-6"	1'-9"					
24"	3.14	.91	.76	62	54	3'-0"	2'-6"	1'-6"	1'-6"	3'-0"	2'-1"					
30"	4.91	1.06	.95	99	66	3'-6"	2'-10"	1'-9"	1'-9"	3'L-1"	2'-6"					
36"	7.07	1.66	1.11	116	62	4'-0"	3'-2"	2'-0"	2'-0"	4'-0"	2'-10"					
42"	9.62	2.10	1.40	139	105	4'-6"	3'-6"	2'-3"	2'-3"	4'-6"	3'L-2"					
46"	12.57	2.32	1.66	162	124	5'-0"	3'-10"	2'-6"	2'-6"	5'L-0"	3'-6"					

REINFORCING STEEL AS INDICATED TO BE INCLUDED IN THE UNIT PRICE \$10
PER CUBIC YARD OF CONCRETE.

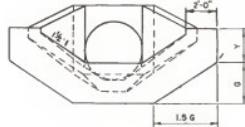
STANDARD DRAWING	
REFERENCE :	DWG. NO.
STANDARD SPEC.	34
SECTION 73	
INLET AND OUTLET HEADWALLS FOR	
R.C.P. AND C.M.P. PIPES	
REVISED	APPROVED
EFFECTIVE 3/1/72	By <i>Frank R. Baschert</i>
ADMINISTRATIVE ENGINEERING DIVISION	





PICTORIAL VIEW OF TRANSITION

SECTION 8-8

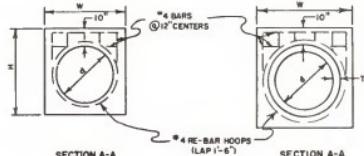
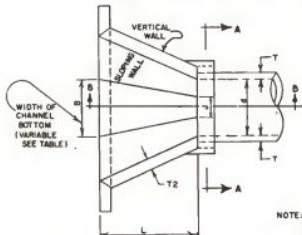


ELEVATION

PLACE RE-BAR IN CENTER OF WALLS,
SLAB, ETC. UNLESS OTHERWISE NOTED.

NOTE: SPACING REINFORCING BAR ABOUT 12" EACH WAY
THROUGHOUT STRUCTURE. USE CONTINUOUS
BARS IN FLOORS AND WALLS WHENEVER
POSSIBLE. WHEN SPLICES ARE MADE, LAP
REINFORCING BAR 1-6.

NOTE: TRASHRACKS WILL BE PROVIDED WHEN REQUIRED. SEE STD. DWG. NO. 36.



SECTION A-A
FOR C.M.P.

SECTION A-A

ALL EXPOSED CORNER
TO BE CHAMFERED 1".

INLET & OUTLET CONCRETE TRANSITIONS FOR C.M.P.~												
CULVERT		DIMENSIONS (FT.-IN.)							QUANTITIES			
DIA" x d"	AREA SQ.FT.	G	J	H	L	T2	W	K	Y	B+d	B+d+f+d"	B+d+z+d"
18"	1.77	2-0	0-5	3-5	3-0	0-6	2-9	0-4	1-3	1-6	0.8	.69
24"	3.14	2-0	0-7	4-0	4-0	0-6	3-3	0-5	1-6	2-0	1.2	.96
30"	4.91	2-0	0-9	4-6	5-0	0-6	3-9	0-7	1-9	2-6	1.5	1.22
36"	7.07	2-6	0-11	5-1	6-0	0-6	4-3	0-8	2-0	3-0	2.1	1.67
42"	9.62	2-6	1-0	5-8	7-4	0-6	4-9	0-9	2-3	3-6	2.6	2.00
48"	12.57	2-6	1-0	6-3	8-0	0-8	5-3	1-0	2-6	4-0	4.2	2.57
										5-0	4.2	2.67
										6-0	4.6	2.76

INLET & OUTLET CONCRETE TRANSITIONS FOR R.C.P.																			
CULVERT		DIMENSIONS (FT.-IN.)						QUANTITIES											
INSIDE O.A. AREA SIZE	G	J	H	L	T	T2	W	K	Y										
18"	17.7	2-0	0-5	3-0	3-0	0-12	0-6	3-2	0-4	1-3	I-6	0.9	74	2-6	0.9	80	3-6	1.0	85
24"	31.4	2-0	0-7	4-3	4-0	3-0	0-6	5-9	0-5	1-8	2-0	12	100	3-0	1.3	106	4-0	1.4	112
30"	4.91	2-0	0-9	4-10	5-0	0-3	0-6	4-4	0-7	1-9	2-6	1.6	127	3-6	1.7	134	4-6	1.8	141
36"	7.07	2-6	0-11	5-6	6-0	4-0	4-8	5-0	2-0	3-2	2.2	174	4-0	2.3	181	5-0	2.4	191	
42"	9.62	2-6	1-0	6-1	7-0	4-0	6-6	5-9	2-9	3-3	3-6	2.7	212	4-6	2.8	222	5-6	2.9	232
48"	12.57	2-12	2-6	8-0	8-0	5-0	8-6	6-1	0-11	2-6	4-0	4.2	267	5-0	4.4	277	6-0	4.6	287

REINFORCING STEEL AS INDICATED TO BE INCLUDED IN THE UNIT PRICE BID PER CUBIC YARD OF CONCRETE.

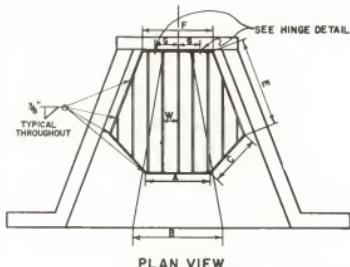
STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 35
SECTION 73

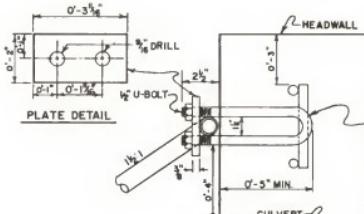
**CONCRETE IRRIGATION INLET AND
OUTLET TRANSITION FOR R.C.P. AND
C.M.P. PIPES**

REVISED	4/1/79	APPROVED <i>Jack P. Baskett</i>
EFFECTIVE	3/1/72	6/1/79 ADMINISTRATOR - ENGINEERING DIVISION



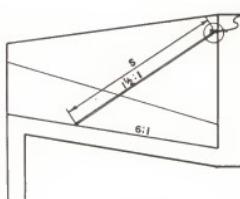


PLAN VIEW



TIE U-BOLTS
TO HEADWALL
RE-BAR.

HINGE DETAIL



SIDE VIEW

SEE HINGE DETAIL

* 3/8" DIA EXTRA STRONG GALV. STEEL PIPE.
(OUTSIDE DIA. = .050")
(INSIDE DIA. = .042")
(PIPE = 1.47 LB/LINEAR FT)
OR
* 5/8" DIA REINFORCING BAR
(RE-BAR = 1.043 LB/LINEAR FT)

NOTE:
PAINT ALL WELDS AND OTHER NON-GALVANIZED
PARTS IN ACCORDANCE WITH STANDARD SPECS.
9. PAINTS AND PAINTING.

USE OF PIPE OR RE-BAR FOR TRASHGUARD
TO BE DETERMINED BY THE ENGINEER.

W= CENTER TO CENTER PIPE OR RE-BAR SPACING.

CULVERT DIA. "G" INCHES	DIMENSIONS (FT.)						B (FT-IN.)	B+d 1/2" G.S.P. OR 5" RE-BAR # (FT.)	1/2" U-BOLT (NO.) (WITH PLATE)	
	A	C	E	F	S	W	G			
18	110	.95	2.04	.80	2.76	.33	.25	1-6	19.6	2
24	145	120	2.55	1.30	3.46	.50	.50	2-0	24.5	2
30	183	160	3.13	1.75	4.32	.50	.75	2-6	36.6	2
36	219	195	3.62	2.25	5.02	.50	.90	3-0	49.3	2
42	258	223	4.15	2.78	5.75	.67	1.20	3-6	52.4	2
48	290	241	4.60	3.30	6.70	.67	1.50	4-0	62.3	2

CULVERT DIA. "G" INCHES	DIMENSIONS (FT.)						B (FT-IN.)	B+d+r-f-0"	1/2" G.S.P. OR 5" RE-BAR # (FT.)	1/2" U-BOLT (NO.) (WITH PLATE)
	A	C	E	F	S	W	G			
18	185	.88	2.16	.75	2.76	.33	.25	2-6	23.7	2
24	219	115	2.62	1.25	3.46	.50	.50	3-0	27.7	2
30	260	151	3.22	1.70	4.32	.50	.70	3-6	39.5	2
36	290	185	3.71	2.25	5.02	.50	.90	4-0	53.3	2
42	323	220	4.20	2.75	5.75	.67	1.15	4-6	56.7	2
48	351	236	4.71	3.23	6.70	.67	1.45	5-0	65.4	2

CULVERT DIA. "G" INCHES	DIMENSIONS (FT.)						B (FT-IN.)	B+d+2r-0"	1/2" G.S.P. OR 5" RE-BAR # (FT.)	1/2" U-BOLT (NO.) (WITH PLATE)
	A	C	E	F	S	W				
18	262	.83	2.25	.70	2.76	.33	20	3-6	27.5	2
24	281	110	2.85	1.20	3.46	.50	45	4-0	32.0	2
30	328	142	3.32	1.65	4.32	.50	65	4-6	43.6	2
36	360	178	3.78	2.20	5.02	.50	.90	5-0	57.2	2
42	392	215	4.32	2.72	5.75	.67	1.15	5-6	60.3	2
48	414	230	4.80	3.20	6.70	.67	1.45	6-0	67.7	2

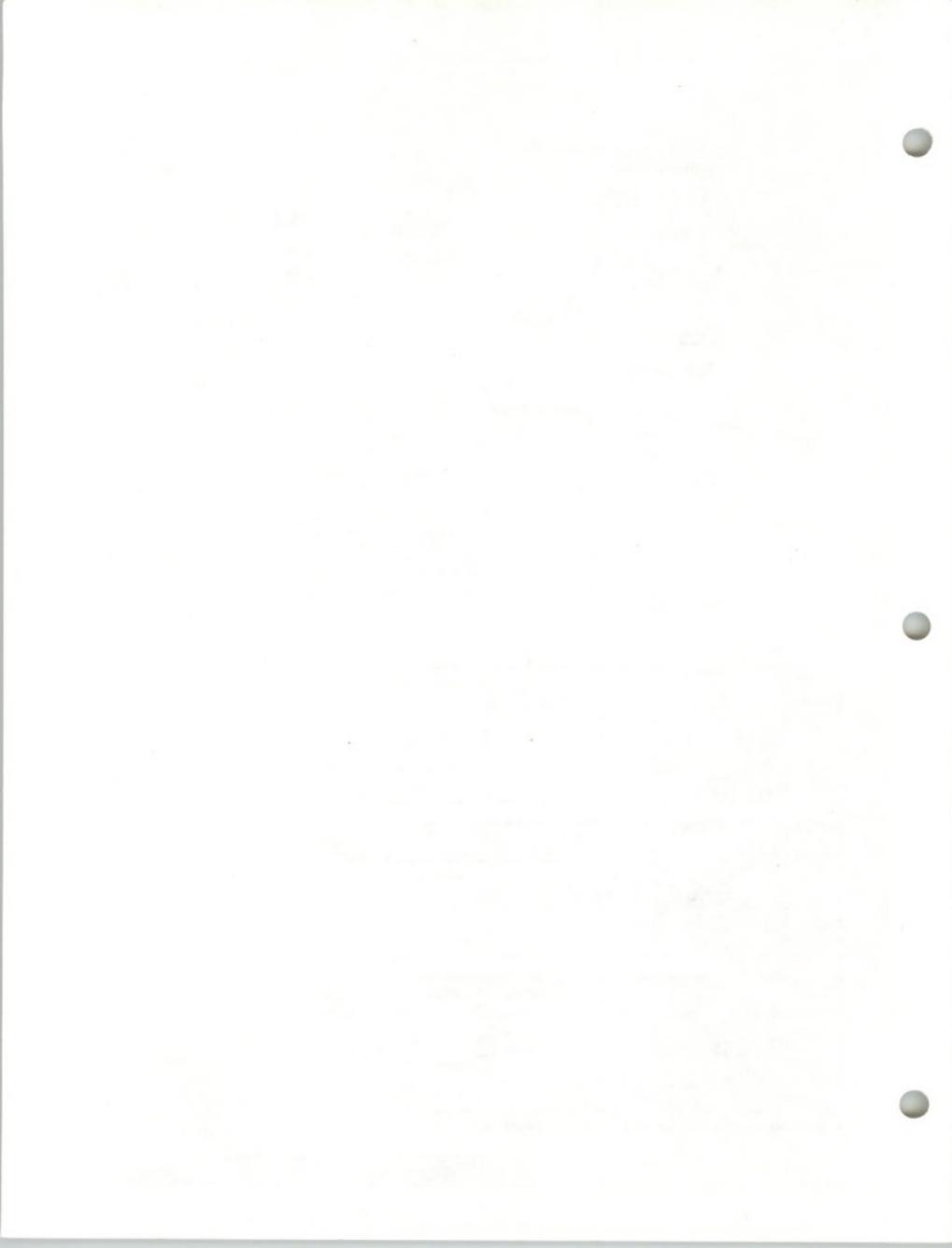
DIMENSIONS AND QUANTITIES ARE FOR ESTIMATING PURPOSES ONLY.

STANDARD DRAWING

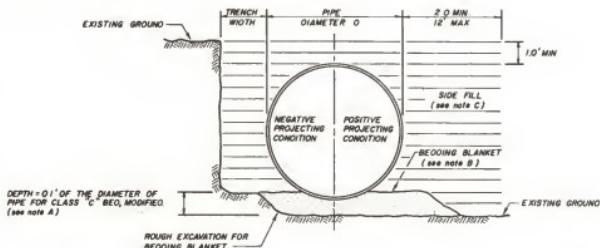
REFERENCE : DWG. NO.
STANDARD SPEC. 36
SECTION 73

TRASHGUARD FOR CONCRETE IRRIGATION
INLET AND OUTLET TRANSITION
STRUCTURES

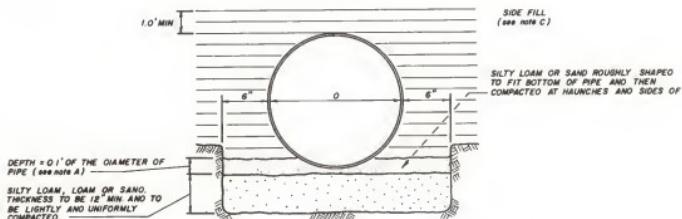
APPROVED
Edward P. Bushell
EFFECTIVE 3/1/72
ADMINISTRATOR - ENGINEERING DIVISION



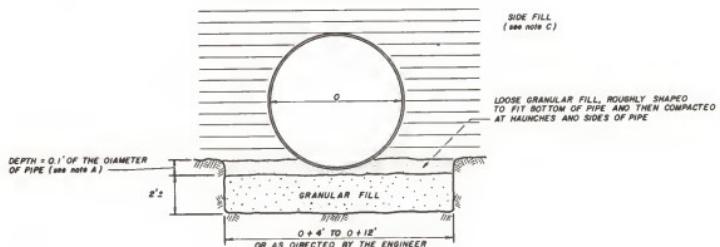
1-PIPE INSTALLATION AND BEDDING
(CLASS C, MODIFIED)



2-ROCK



3-FOUNDATION STABILIZATION



NOTES

- (A) FOR STRUCTURAL PLATE PIPE, THE LENGTH OF BEDDING ARC NEED NOT EXCEED WIDTH OF BOTTOM PLATE.
- (B) BEDDING BLANKET OF SILTY LOAM OR SAND ROUGHLY SHAPED TO FIT BOTTOM OF PIPE. MINIMUM THICKNESS BEFORE PLACING PIPE IS 3".
- (C) SIDE FILL TO BE COMPACTED IN 6" LAYER, TO DENSITY SPECIFIED FOR ADJACENT EMBANKMENT. SEE ARTICLE 11.05 OF STANDARD SPECIFICATIONS FOR THE DENSITY REQUIREMENTS.

STANDARD DRAWING

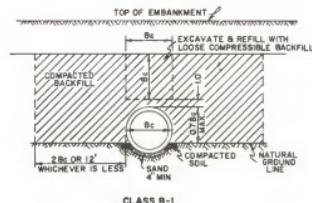
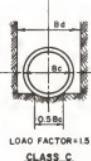
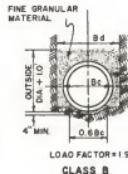
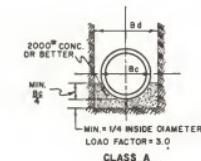
REFERENCE:	DWG. NO.
STANDARD SPEC.	40
SECTION 54	

C.S.P. & S.S.P.P.
CULVERT BEDDING

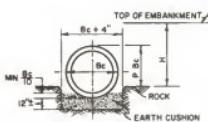
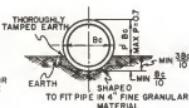
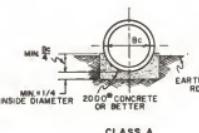
REVISED	APPROVED
EFFECTIVE	3/1/72
ADMINISTRATOR-ENGINEERING DIVISION	



TYPES OF TRENCH BEDDING



TYPES OF EMBANKMENT BEDDING



DESCRIPTION OF BEDDING CLASSES

CLASS A CONCRETE CRADLE BEDDING. The lower part of the pipe exterior shall be bedded in a continuous cradle constructed of 2000 pound concrete or better, having a minimum thickness under the pipe of one-fourth the nominal inside diameter and extending up the sides of the pipe for a height equal to one-fourth of the outside diameter. The cradle shall have a width at least equal to the outside diameter of the pipe plus 8" and it shall be constructed monolithically without horizontal construction joints.

CLASS B BEDDING. (1) This class of bedding for embankment condition is applicable only when the projection ratio is not greater than 0.7. The pipe shall be carefully bedded on fine granular materials over an earth foundation, accurately shaped by means of a template to fit the lower part of the pipe exterior for at least 10% of the culvert overall height. Compatable soil material shall then be rammed and tamped in layers not more than 6" thick, around the pipe for the remainder of the lower 20% of its height. Backfilling to the top of the pipe shall conform with the applicable provisions of the standard specifications.

(2) For trench conditions, the culvert is placed as described in B (1) except that the earth foundation needs to be shaped to fit the lower part of the culvert exterior for a width of at least 60% of the culvert breadth. Then the remainder of the culvert is entirely surrounded to a height of at least 12" above its top by granular material placed by hand to fill all spaces under and adjacent to the culvert. The fill is tamped thoroughly on each side and under the culvert as far practicable in layers not to exceed 6" in thickness.

CLASS B-I BEDDING. In this type of installation, sometimes called the Imperfect Trench Method, the pipe culvert shall be first installed in accordance with the requirements of B (2). Then the fill shall be compacted at each side of the pipe for a lateral distance equal to twice the outside diameter or 12', whichever is less, and carried up to elevation above the top of the pipe equal to the outside diameter of the pipe plus 12". Next a trench equal in width to the outside diameter of the pipe shall be dug in the fill directly over the culvert, down to an elevation 12" above the top of the pipe. Care shall be exercised to keep the sides as vertical as possible.

After the trench is excavated, it shall be refilled with loose, highly compressible soil material. Straw, hay, leaves, brush or sawdust may be used to fill the lower one-fourth to one-third of the trench in order to insure high compressibility of this backfill. The backfill of straw, hay, etc., shall not be carried closer than 10' to the outside slope of the fill; the outside 10' shall be composed of impervious material, thoroughly compacted. After the backfill is completed, the balance of the fill shall be constructed by normal methods up to the finished grade of embankment.

CLASS C BEDDING. For projecting embankment culvert, this method of bedding is bedded with "ordinary" care in an earth foundation shaped in the form of an arc to fit the lower part of the culvert exterior with reasonably closeness for at least 10% of its overall height. The remainder of pipe shall be surrounded by material placed by hand tools to fill completely all spaces under and adjacent to the pipe. Backfilling to the top shell then be completed as specified in the standard specifications. If the culvert is placed on rock foundations, projecting embankment culvert pipes are bedded on an earth cushion having a minimum allowable thickness of 12' ± and with the earth foundation carefully shaped and filled around the culvert the same as ordinary projecting embankment bedding on an earth foundation.

CLASS C-I BEDDING. The pipe shall be installed in accordance with Class B Bedding. The Imperfect trench method shall then be used as described under Class B-1 Bedding.

When natural ground material simulates bedding material, no special bedding material need be used. Use Class "C" unless otherwise noted on plans.

COMPACTION. All foundations shall be compacted.

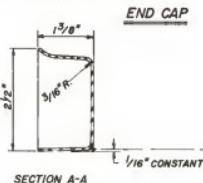
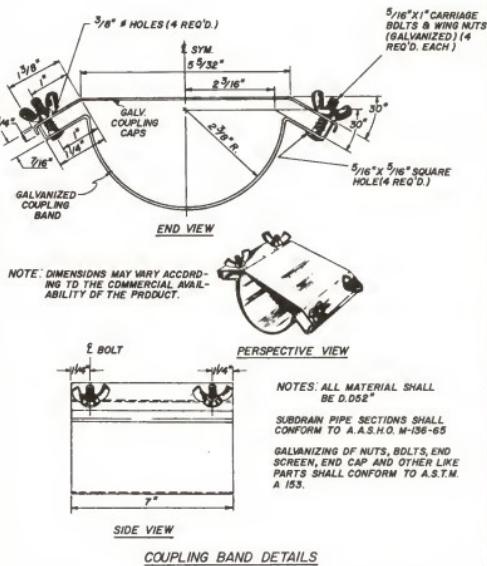
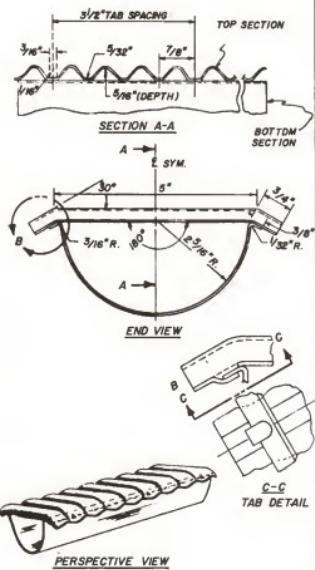
STANDARD DRAWING

REFERENCE : DWG. NO.
STANDARD SPEC. 41
SECTION 54

R.C.P. CULVERT BEDDING

REVISED	4/1/79	APPROVED	By <i>R. Barket</i>
EFFECTIVE	3/1/72	6/1/79	ADMINISTRATOR - ENGINEERING DIVISION



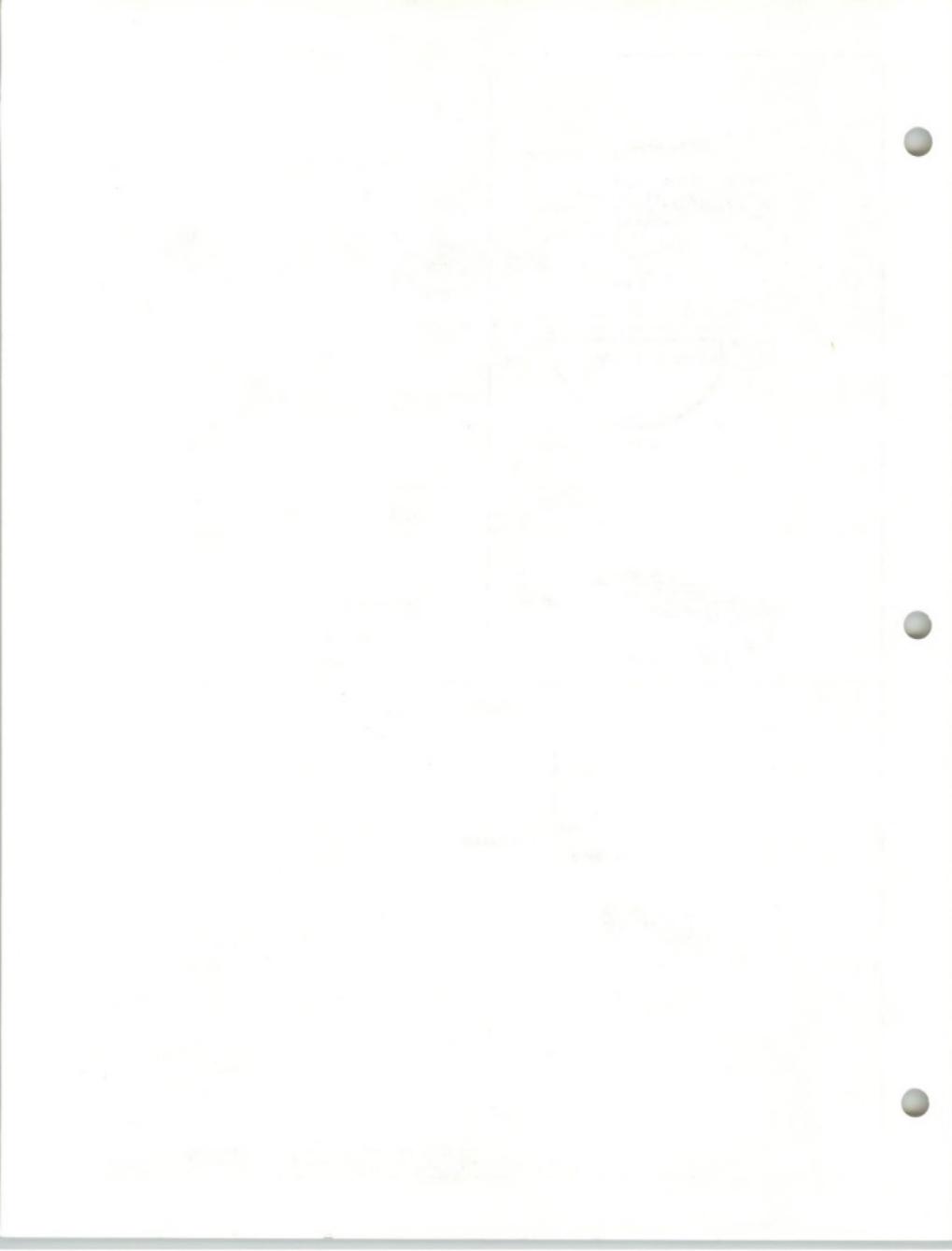


NOTES: MATERIAL TO BE 18 GA. COPPER BEARING
GALVANIZED STEEL.
END OF CAP TO FIT SNUG WHEN INSERTED
INSIDE END OF UNDERDRAIN.
TOLERANCES ARE $\pm \frac{1}{16}$ " EXCEPT AS SHOWN.
 $\frac{1}{2}$ " GALV. MESH SCREEN, SHAPED LIKE THE
CAP, TO BE PROVIDED FOR EACH PIPE OUTLET.

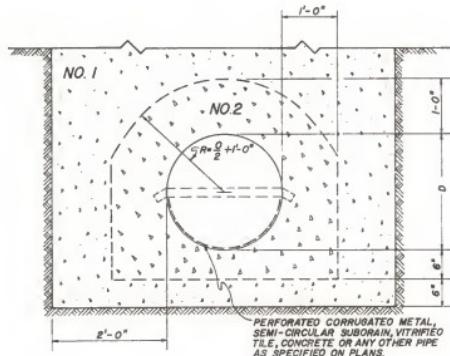
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	42
SECTION 69	
SEMICIRCULAR UNDERDRAIN	
REVISED	EFFECTIVE
APPROVED	R. R.
ADMINISTRATOR-ENGINEERING DIVISION	

REVISED
EFFECTIVE 3/1/72

APPROVED
R. R.
ADMINISTRATOR-ENGINEERING DIVISION



FOR PERFORATED CORRUGATED METAL PIPE, SEMI-CIRCULAR
SUBDRAIN OR *OPEN JOINT CONCRETE PIPE



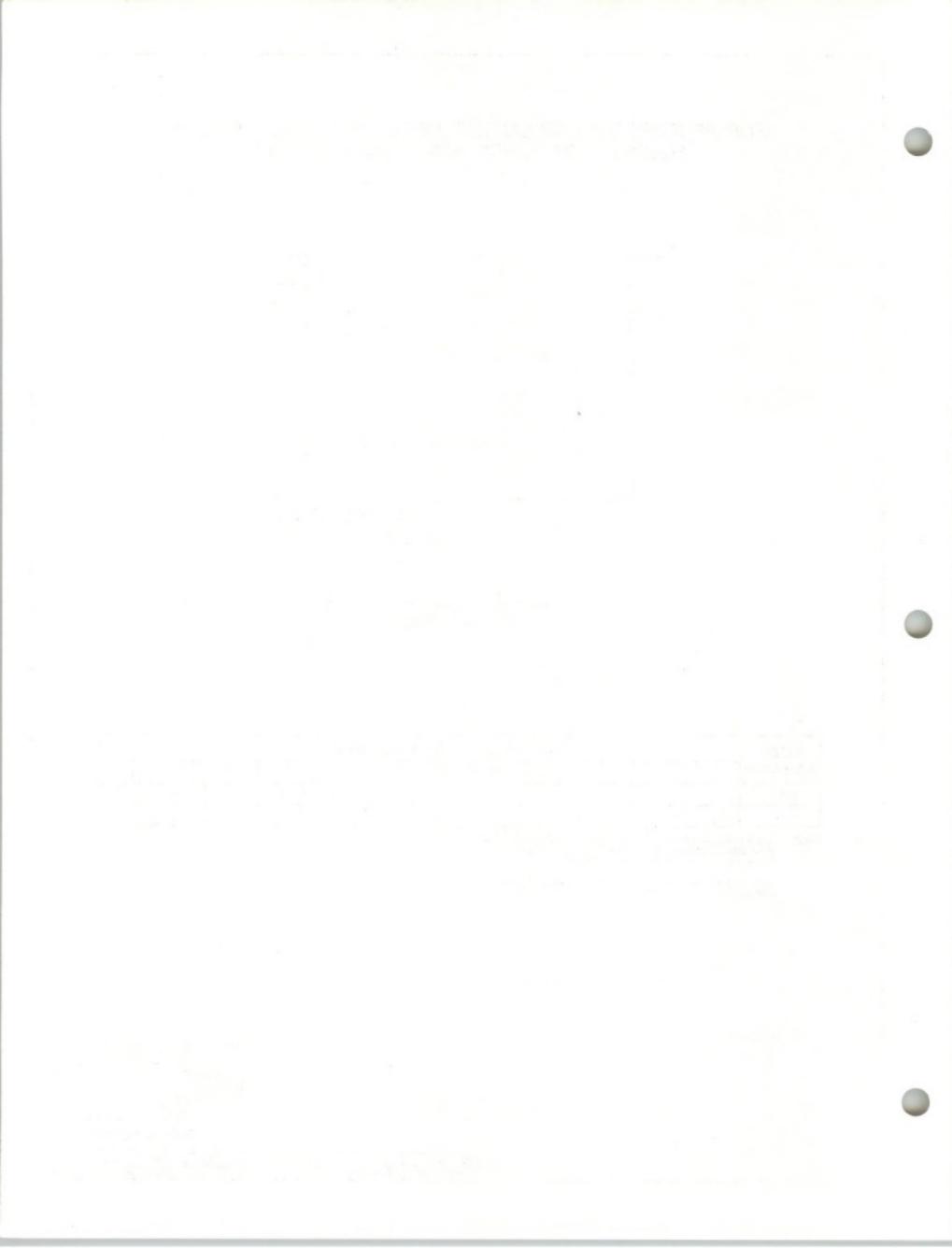
NOTE: USE PULLBOARDS OF 0+8" HEIGHT TO
SEPARATE NO. 1 & NO. 2 MATERIAL DUR-
PLACEMENT AND THEN REMOVE.

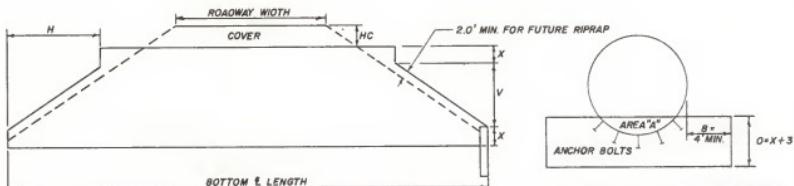
FILTER GRADATION	PERCENT PASSING STD. A.S.T.M. SIEVE											
	2	1/2	1/4	1	3/4	1/2	3/8	NO. 4	8	16	50	100
NO. 1							100	95-100	65-95	35-80	5-30	0-10
NO. 2	100	95-100	70-95		35-70		10-30	0-5				

*NOTE: WHEN OPEN JOINT PIPE IS USED JOINT SHOULD BE WRAPPED
WITH BRASS, BRONZE OR COPPER NO. 4 MESH HARDWARE
CLOTH BEFORE FILTER MATERIAL IS PLACED.

BOTH GRADATIONS SHALL BE COMBINED AND BIO AS "FILTER
MATERIAL."

STANDARD DRAWING											
REFERENCE: DWG. NO. STANDARD SPEC. 43 SECTION 54											
FILTER MATERIAL FOR UNDERDRAINS											
REVISED	EFFECTIVE	3/1/72									
APPROVED By <i>[Signature]</i> ADMINISTRATOR - ENGINEERING DIVISION											





NOTE: FOR DETAILS, SEE STANDARD DWG. NO. 30
COVERING CUTOFF WALLS

IN.	X IN.	H IN FEET FOR BEVELS OF:		V IN. (F.T.)	AREA IN. SQ.FT.
		15° 1'	21° 1'		
48	1,000	3,000	4,000	2,000	24.6
54	1,136	3,156	4,156	2,500	30.0
60	1,250	3,750	5,000	2,500	3.83
66	1,375	4,125	5,500	2,750	4.44
72	1,500	4,500	6,000	3,000	5.53
78	1,625	4,875	6,500	3,250	6.61
84	1,750	5,250	7,000	3,500	7.51
90	1,875	5,625	7,500	3,750	8.61
96	2,000	6,000	8,000	4,000	9.81
102	2,125	6,375	8,500	4,250	11.01
108	2,250	6,750	9,000	4,500	12.42
114	2,375	7,125	9,500	4,750	13.82
120	2,500	7,500	10,000	5,000	15.38
126	2,625	7,875	10,500	5,250	16.96
132	2,750	8,250	11,000	5,500	18.50

O.I.A. (IN.)	X # (FT.)	H IN FEET FOR BEVELS OF:	V # (FT.)	AREA OF SO.FT.
135	2.875	8.625	11.500	2.750
144	3.000	9.000	12.000	2.820
153	3.125	9.375	12.500	2.890
156	3.250	9.750	13.000	2.959
162	3.375	10.125	13.500	2.79.7
168	3.500	10.500	14.000	3.01.1
174	3.625	10.875	14.500	3.750
177	3.750	11.250	15.000	3.720
192	4.000	12.000	16.000	3.93.3
198	4.125	12.375	16.500	4.17
204	4.250	12.750	17.000	4.42
210	4.375	13.125	17.500	4.69
216	4.500	13.500	18.000	4.97
228	4.750	14.250	19.000	5.55
232	4.875	15.000	19.500	5.000
252	5.250	15.750	21.000	6.77

TOLERANCE OF $\pm 4\%$ WILL BE ALLOWED IN ALL DIMENSIONS.

USE SKEW ENDS WHEN SKEW IS GREATER THAN 15° BUT NOT GREATER THAN 45°

H FOR ELLIPTICAL PIPE, INCREASE VERTICAL DIMENSIONS BY PERCENT OF ELLIPSE

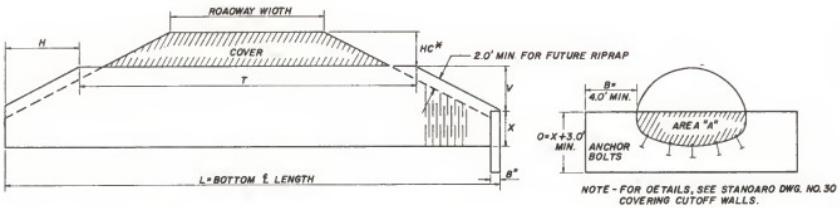
STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 44
SECTION 59

**STEP BEVEL FOR
CIRCULAR C.S.P & S.S.P**

REVISED	12/20/74	APPROVED
EFFECTIVE	3/1/72	BY <i>Jek P. Ralst</i> ADMINISTRATOR-ENGINEERING DIVISION





TOLERANCE OF $\pm 4\%$ WILL BE ALLOWED IN ALL DIMENSIONS.
USE SKEW ENDS WHEN SKEW IS GREATER THAN 15° BUT NOT GREATER THAN 45°.

$$X \text{ HC} = \frac{S}{4} \text{ OR } A \text{ MIN.} = 24"$$

HC MEASURED VERTICALLY FROM FINISHED LOW SHOULDER TO TOP OF PIPE.

IF POSSIBLE IT IS DESIRABLE THAT TOP OF PIPE BE PLACED A MIN. OF 1.0' BELOW SUBGRADE SURFACE.

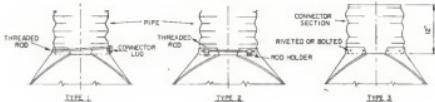
SPAN	RISE	EQUIV. OIA.	H IN FEET FOR BEVELS OF 1/2:1 2:1 2½:1			V	X	AREA "A"
			1/2" CORNER PLATES	3/4" CORNER PLATES	1" CORNER PLATES			
6'-1"	4'-7"	66	3.5	4.7	5.8	2.3	2.3	12
6'-9"	4'-11"	72	3.8	5.0	6.3	2.5	2.4	14
7'-2"	5'-3"	78	4.0	6.3	7.9	3.2	2.1	14
7'-11"	8'-6"	84	5.1	6.8	8.0	3.4	2.2	15
8'-7"	8'-11"	90	5.4	7.2	8.9	3.6	2.3	17
9'-4"	8'-3"	96	5.7	7.7	9.5	3.8	2.4	19
9'-9"	6'-7"	102	6.8	8.8	11.0	4.4	2.2	19
10'-8"	6'-11"	108	6.3	8.5	10.4	4.2	2.8	25
11'-2"	7'-7"	114	6.6	9.0	11.0	4.4	2.8	27
11'-10"	7'-11"	120	7.7	10.2	12.7	5.1	3.5	26
12'-6"	7'-11"	126	7.9	10.5	13.1	5.3	2.7	29
12'-10"	8'-4"	132	9.0	12.0	15.0	6.0	2.3	25

3/4" CORNER PLATES								
14'-0"	9'-8"	144	9.6	12.8	16.0	6.4	3.3	38
15'-6"	10'-4"	156	10.2	13.6	17.0	6.8	3.5	44
16'-6"	11'-0"	168	11.4	15.2	19.0	7.6	3.4	47
17'-11"	11'-8"	182	12.8	16.5	20.2	8.1	3.5	55
19'-3"	12'-8"	192	13.8	17.0	21.0	8.5	3.8	60
20'-5"	13'-0"	204	13.8	18.4	23.0	9.2	3.8	63

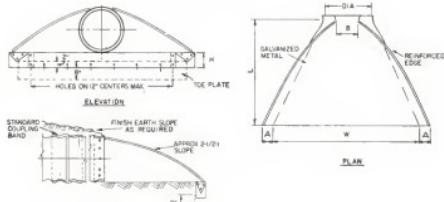
STANDARD DRAWING		
REFERENCE:	DWG. NO.	
STANDARD SPEC.		45
SECTION 59		
BEVEL ON STRUCT. PLATE PIPE-ARCH		
REVISED		
EFFECTIVE	3/1/72	
APPROVED		
BY	John D. Parker	
ADMINISTRATOR-ENGINEERING DIVISION		



CONNECTIONS



ROUND PIPE



TYPICAL CROSS-SECTION

FLARED END TERMINAL SECTION TO BE INCLUDED IN LENGTH OF PIPE SHOWN ON PLANS

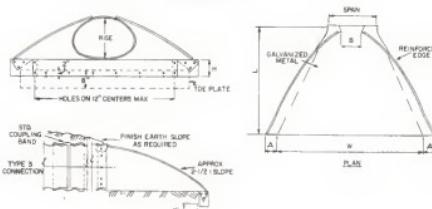
ALL PARTS ARE TO BE GALVANIZED IN ACCORDANCE

WITH ABSIC M-36
ANY AREAS WHERE GALVANIZING IS BROKEN OR METAL
IS BARE SHALL BE PAINTED WITH ONE COAT OF RED LEAD OR
ZINC CHROMATE PRIME AND TWO COAT OF ALUMINUM PAINT.
MINOR VARIATIONS IN DESIGN MAY BE ACCEPTABLE ON
APPROVAL OF THE ENGINEER. AN APRON WHICH IS ENTIRELY
OF THE APRON WILL BE ACCEPTABLE IF SECURELY BOLTED OR
WELDED AND PAINTED AS PROVIDED ABOVE.

SEE DETAIL THAT SHAPES

Dimensions									
SL. No.	Designation	Size	Thickness	Unit	L	W	H	R ₁	R ₂
1	1" x 3"	1/8"	0.044	"	7	9	6	1/4	1/8
2	1" x 4"	1/8"	0.044	"	7	12	6	1/4	1/8
3	1" x 5"	1/8"	0.044	"	7	15	6	1/4	1/8
4	1" x 6"	1/8"	0.044	"	7	18	6	1/4	1/8
5	1" x 8"	1/8"	0.044	"	7	24	6	1/4	1/8
6	1" x 10"	1/8"	0.044	"	7	30	6	1/4	1/8
7	1" x 12"	1/8"	0.044	"	7	36	6	1/4	1/8
8	1" x 14"	1/8"	0.044	"	7	42	6	1/4	1/8
9	1" x 16"	1/8"	0.044	"	7	48	6	1/4	1/8
10	1" x 18"	1/8"	0.044	"	7	54	6	1/4	1/8
11	1" x 20"	1/8"	0.044	"	7	60	6	1/4	1/8
12	1" x 24"	1/8"	0.044	"	7	72	6	1/4	1/8
13	1" x 28"	1/8"	0.044	"	7	84	6	1/4	1/8
14	1" x 32"	1/8"	0.044	"	7	96	6	1/4	1/8
15	1" x 36"	1/8"	0.044	"	7	108	6	1/4	1/8
16	1" x 40"	1/8"	0.044	"	7	120	6	1/4	1/8
17	1" x 48"	1/8"	0.044	"	7	144	6	1/4	1/8
18	1" x 56"	1/8"	0.044	"	7	160	6	1/4	1/8
19	1" x 64"	1/8"	0.044	"	7	176	6	1/4	1/8
20	1" x 72"	1/8"	0.044	"	7	192	6	1/4	1/8
21	1" x 80"	1/8"	0.044	"	7	208	6	1/4	1/8
22	1" x 88"	1/8"	0.044	"	7	224	6	1/4	1/8
23	1" x 96"	1/8"	0.044	"	7	240	6	1/4	1/8
24	1" x 104"	1/8"	0.044	"	7	256	6	1/4	1/8
25	1" x 112"	1/8"	0.044	"	7	272	6	1/4	1/8
26	1" x 120"	1/8"	0.044	"	7	288	6	1/4	1/8
27	1" x 128"	1/8"	0.044	"	7	304	6	1/4	1/8
28	1" x 136"	1/8"	0.044	"	7	320	6	1/4	1/8
29	1" x 144"	1/8"	0.044	"	7	336	6	1/4	1/8
30	1" x 152"	1/8"	0.044	"	7	352	6	1/4	1/8
31	1" x 160"	1/8"	0.044	"	7	368	6	1/4	1/8
32	1" x 176"	1/8"	0.044	"	7	392	6	1/4	1/8
33	1" x 192"	1/8"	0.044	"	7	416	6	1/4	1/8
34	1" x 208"	1/8"	0.044	"	7	440	6	1/4	1/8
35	1" x 224"	1/8"	0.044	"	7	464	6	1/4	1/8
36	1" x 240"	1/8"	0.044	"	7	480	6	1/4	1/8
37	1" x 256"	1/8"	0.044	"	7	504	6	1/4	1/8
38	1" x 272"	1/8"	0.044	"	7	520	6	1/4	1/8
39	1" x 288"	1/8"	0.044	"	7	544	6	1/4	1/8
40	1" x 304"	1/8"	0.044	"	7	560	6	1/4	1/8
41	1" x 320"	1/8"	0.044	"	7	576	6	1/4	1/8
42	1" x 336"	1/8"	0.044	"	7	592	6	1/4	1/8
43	1" x 352"	1/8"	0.044	"	7	608	6	1/4	1/8
44	1" x 368"	1/8"	0.044	"	7	624	6	1/4	1/8
45	1" x 384"	1/8"	0.044	"	7	640	6	1/4	1/8
46	1" x 400"	1/8"	0.044	"	7	656	6	1/4	1/8
47	1" x 416"	1/8"	0.044	"	7	672	6	1/4	1/8
48	1" x 432"	1/8"	0.044	"	7	688	6	1/4	1/8
49	1" x 448"	1/8"	0.044	"	7	704	6	1/4	1/8
50	1" x 464"	1/8"	0.044	"	7	720	6	1/4	1/8
51	1" x 480"	1/8"	0.044	"	7	736	6	1/4	1/8
52	1" x 496"	1/8"	0.044	"	7	752	6	1/4	1/8
53	1" x 512"	1/8"	0.044	"	7	768	6	1/4	1/8
54	1" x 528"	1/8"	0.044	"	7	784	6	1/4	1/8
55	1" x 544"	1/8"	0.044	"	7	800	6	1/4	1/8
56	1" x 560"	1/8"	0.044	"	7	816	6	1/4	1/8
57	1" x 576"	1/8"	0.044	"	7	832	6	1/4	1/8
58	1" x 592"	1/8"	0.044	"	7	848	6	1/4	1/8
59	1" x 608"	1/8"	0.044	"	7	864	6	1/4	1/8
60	1" x 624"	1/8"	0.044	"	7	880	6	1/4	1/8
61	1" x 640"	1/8"	0.044	"	7	896	6	1/4	1/8
62	1" x 656"	1/8"	0.044	"	7	912	6	1/4	1/8
63	1" x 672"	1/8"	0.044	"	7	928	6	1/4	1/8
64	1" x 688"	1/8"	0.044	"	7	944	6	1/4	1/8
65	1" x 704"	1/8"	0.044	"	7	960	6	1/4	1/8
66	1" x 720"	1/8"	0.044	"	7	976	6	1/4	1/8
67	1" x 736"	1/8"	0.044	"	7	992	6	1/4	1/8
68	1" x 752"	1/8"	0.044	"	7	1008	6	1/4	1/8
69	1" x 768"	1/8"	0.044	"	7	1024	6	1/4	1/8
70	1" x 784"	1/8"	0.044	"	7	1040	6	1/4	1/8
71	1" x 800"	1/8"	0.044	"	7	1056	6	1/4	1/8
72	1" x 816"	1/8"	0.044	"	7	1072	6	1/4	1/8
73	1" x 832"	1/8"	0.044	"	7	1088	6	1/4	1/8
74	1" x 848"	1/8"	0.044	"	7	1104	6	1/4	1/8
75	1" x 864"	1/8"	0.044	"	7	1120	6	1/4	1/8
76	1" x 880"	1/8"	0.044	"	7	1136	6	1/4	1/8
77	1" x 896"	1/8"	0.044	"	7	1152	6	1/4	1/8
78	1" x 912"	1/8"	0.044	"	7	1168	6	1/4	1/8
79	1" x 928"	1/8"	0.044	"	7	1184	6	1/4	1/8
80	1" x 944"	1/8"	0.044	"	7	1200	6	1/4	1/8
81	1" x 960"	1/8"	0.044	"	7	1216	6	1/4	1/8
82	1" x 976"	1/8"	0.044	"	7	1232	6	1/4	1/8
83	1" x 992"	1/8"	0.044	"	7	1248	6	1/4	1/8
84	1" x 1008"	1/8"	0.044	"	7	1264	6	1/4	1/8
85	1" x 1024"	1/8"	0.044	"	7	1280	6	1/4	1/8
86	1" x 1040"	1/8"	0.044	"	7	1296	6	1/4	1/8
87	1" x 1056"	1/8"	0.044	"	7	1312	6	1/4	1/8
88	1" x 1072"	1/8"	0.044	"	7	1328	6	1/4	1/8
89	1" x 1088"	1/8"	0.044	"	7	1344	6	1/4	1/8
90	1" x 1104"	1/8"	0.044	"	7	1360	6	1/4	1/8
91	1" x 1120"	1/8"	0.044	"	7	1376	6	1/4	1/8
92	1" x 1136"	1/8"	0.044	"	7	1392	6	1/4	1/8
93	1" x 1152"	1/8"	0.044	"	7	1408	6	1/4	1/8
94	1" x 1168"	1/8"	0.044	"	7	1424	6	1/4	1/8
95	1" x 1184"	1/8"	0.044	"	7	1440	6	1/4	1/8
96	1" x 1200"	1/8"	0.044	"	7	1456	6	1/4	1/8
97	1" x 1216"	1/8"	0.044	"	7	1472	6	1/4	1/8
98	1" x 1232"	1/8"	0.044	"	7	1488	6	1/4	1/8
99	1" x 1248"	1/8"	0.044	"	7	1504	6	1/4	1/8
100	1" x 1264"	1/8"	0.044	"	7	1520	6	1/4	1/8
101	1" x 1272"	1/8"	0.044	"	7	1536	6	1/4	1/8
102	1" x 1280"	1/8"	0.044	"	7	1552	6	1/4	1/8
103	1" x 1296"	1/8"	0.044	"	7	1568	6	1/4	1/8
104	1" x 1312"	1/8"	0.044	"	7	1584	6	1/4	1/8
105	1" x 1328"	1/8"	0.044	"	7	1600	6	1/4	1/8
106	1" x 1344"	1/8"	0.044	"	7	1616	6	1/4	1/8
107	1" x 1360"	1/8"	0.044	"	7	1632	6	1/4	1/8
108	1" x 1376"	1/8"	0.044	"	7	1648	6	1/4	1/8
109	1" x 1392"	1/8"	0.044	"	7	1664	6	1/4	1/8
110	1" x 1408"	1/8"	0.044	"	7	1680	6	1/4	1/8
111	1" x 1424"	1/8"	0.044	"	7	1696	6	1/4	1/8
112	1" x 1440"	1/8"	0.044	"	7	1712	6	1/4	1/8
113	1" x 1456"	1/8"	0.044	"	7	1728	6	1/4	1/8
114	1" x 1472"	1/8"	0.044	"	7	1744	6	1/4	1/8
115	1" x 1488"	1/8"	0.044	"	7	1760	6	1/4	1/8
116	1" x 1504"	1/8"	0.044	"	7	1776	6	1/4	1/8
117	1" x 1520"	1/8"	0.044	"	7	1792	6	1/4	1/8
118	1" x 1536"	1/8"	0.044	"	7	1808	6	1/4	1/8
119	1" x 1552"	1/8"	0.044	"	7	1824	6	1/4	1/8
120	1" x 1568"	1/8"	0.044	"	7	1840	6	1/4	1/8
121	1" x 1584"	1/8"	0.044	"	7	1856	6	1/4	1/8
122	1" x 1600"	1/8"	0.044	"	7	1872	6	1/4	1/8
123	1" x 1616"	1/8"	0.044	"	7	1888	6	1/4	1/8
124	1" x 1632"	1/8"	0.044	"	7	1904	6	1/4	1/8
125	1" x 1648"	1/8"	0.044	"	7	1920	6	1/4	1/8
126	1" x 1664"	1/8"	0.044	"	7	1936	6	1/4	1/8
127	1" x 1680"	1/8"	0.044	"	7	1952	6	1/4	1/8
128	1" x 1696"	1/8"	0.044	"	7	1968	6	1/4	1/8
129	1" x 1712"	1/8"	0.044	"	7	1984	6	1/4	1/8
130	1" x 1728"	1/8"	0.044	"	7	2000	6	1/4	1/8
131	1" x 1744"	1/8"	0.044	"	7	2016	6	1/4	1/8
132	1" x 1760"	1/8"	0.044	"	7	2032	6	1/4	1/8
133	1" x 1776"	1/8"	0.044	"	7	2048	6	1/4	1/8
134	1" x 1792"	1/8"	0.044	"	7	2064	6	1/4	1/8
135	1" x 1808"	1/8"	0.044	"	7	2080	6	1/4	1/8
136	1" x 1824"	1/8"	0.044	"	7	2096	6	1/4	1/8
137	1" x 1840"	1/8"	0.044	"	7	2112	6	1/4	1/8
138	1" x 1856"	1/8"	0.044	"	7	2128	6	1/4	1/8
139	1" x 1872"	1/8"	0.044	"	7	2144	6	1/4	1/8
140	1" x 1888"	1/8"	0.044	"	7	2160	6	1/4	1/8
141	1" x 1904"	1/8"	0.044	"	7	2176	6	1/4	1/8
142	1" x 1920"	1/8"	0.044	"	7	2192	6	1/4	1/8
143	1" x 1936"	1/8"	0.044	"	7	2208	6	1/4	1/8
144	1" x 1952"	1/8"	0.044						

ARCH PIPE

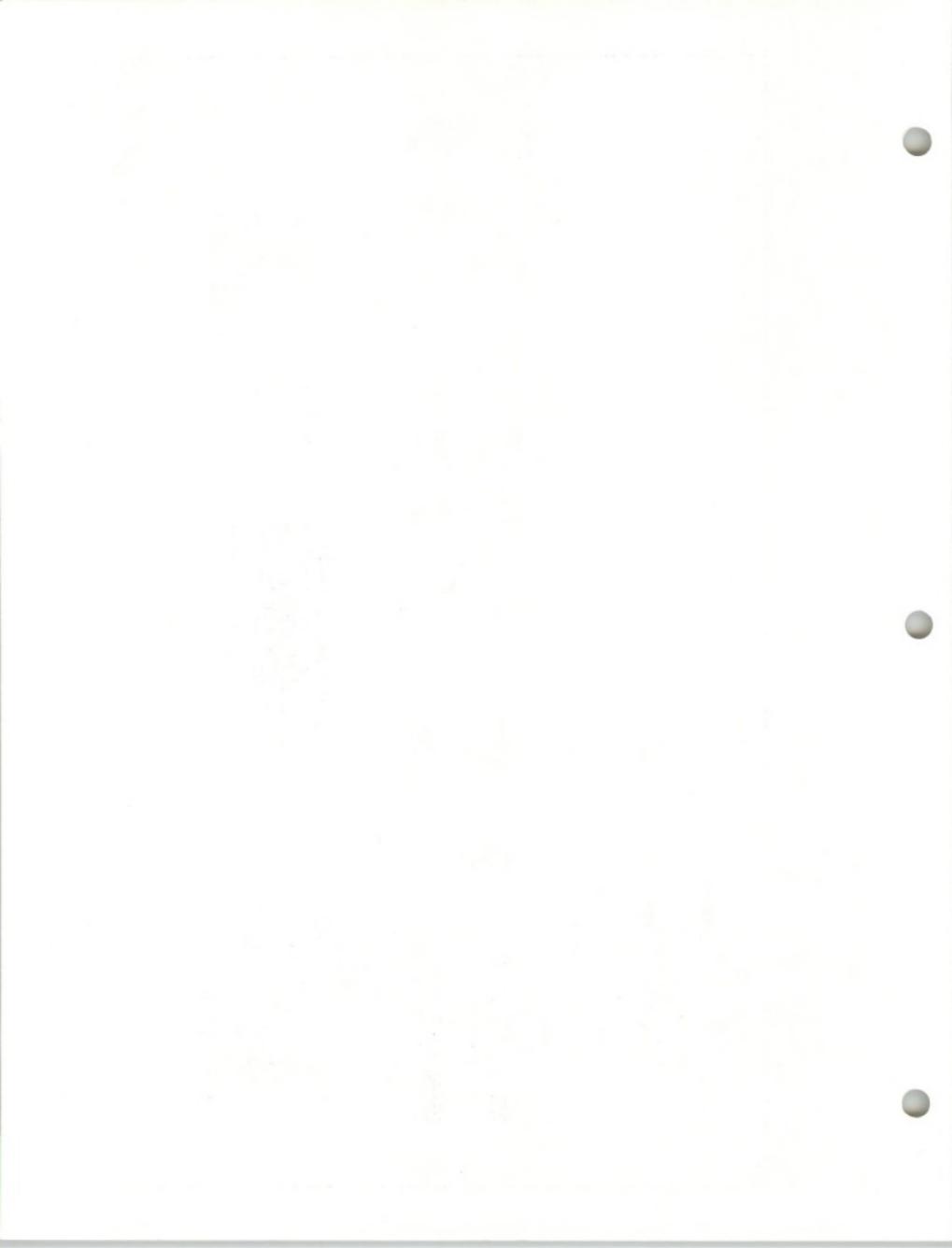


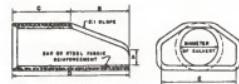
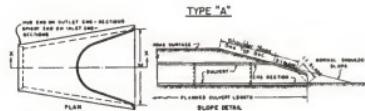
STANDARD DRAWING
REFERENCE

**STANDARD SPEC.
SECTION 86 AND 87**

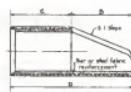
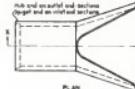
-CORRUGATED METAL PIPE-

REVISED	10/20/76	4/77
EFFECTIVE	3/1/77	5/1/77



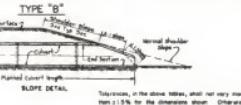


TYPE "A"						
TERMINAL SECTION DIMENSION						
DIA	A	B	C	D	E	F
4"	4"	2'-0"	4'-0 1/2"	5'-0"	5'-0"	5'-0"
10"	6"	6"	8'-0"	8'-0"	8'-0"	8'-0"
16"	8"	8"	9'-0"	9'-0"	9'-0"	9'-0"
24"	10"	10"	10'-0"	10'-0"	10'-0"	10'-0"
30"	10"	10"	11'-0"	11'-0"	10'-0"	10'-0"
36"	10"	10"	12'-0"	12'-0"	10'-0"	10'-0"
42"	10"	10"	12'-0"	12'-0"	10'-0"	10'-0"
48"	10"	10"	12'-0"	12'-0"	10'-0"	10'-0"



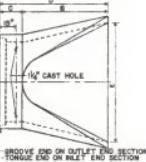
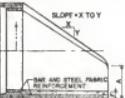
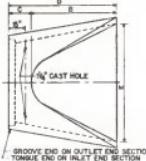
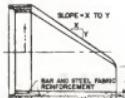
TYPE "A"

TYPE "B"						
TERMINAL SECTION DIMENSION						
DIA	A	B	C	D	E	F
4"	4"	2'-0"	4'-0 1/2"	5'-0"	5'-0"	5'-0"
10"	6"	6"	8'-0"	8'-0"	8'-0"	8'-0"
16"	8"	8"	9'-0"	9'-0"	9'-0"	9'-0"
24"	10"	10"	10'-0"	10'-0"	10'-0"	10'-0"
30"	10"	10"	11'-0"	11'-0"	10'-0"	10'-0"
36"	10"	10"	12'-0"	12'-0"	10'-0"	10'-0"
42"	10"	10"	12'-0"	12'-0"	10'-0"	10'-0"
48"	10"	10"	12'-0"	12'-0"	10'-0"	10'-0"



SECTION B-B

Tolerance on the above tables, when not very many, less than 1/16", for the dimensions should. Dimension line shall conform to AASHTO M-170.



DIA	SLOPE	T	A	B	C	D	E	F
4"	1:10	1"	4'	4'	4'	4'	4'	4'
10"	1:10	1"	6'	6'	6'	6'	6'	6'
16"	1:10	1"	8'	8'	8'	8'	8'	8'
24"	1:10	1"	10'	10'	10'	10'	10'	10'
30"	1:10	1"	11'	11'	10'	10'	10'	10'
36"	1:10	1"	12'	12'	10'	10'	10'	10'
42"	1:10	1"	12'	12'	10'	10'	10'	10'
48"	1:10	1"	12'	12'	10'	10'	10'	10'

THE ABOVE THE BOLTS TO BE USED ON 10" AND 16" DIAMETER PIPES ARE TO BE ONE ON EACH SIDE OF THE OUTLET SIDE AND ONE ON EACH SIDE AT THE RESIDENTIAL, SMALL PIPES USE ONE BOLT. ALL PARTS SHALL BE ULTRASONIC TESTED.

CONSTRUCTION: CONSTRUCTION SHALL COMPLY TO CALIFORNIA TITLE 24, SECTION 1701, AS FAR AS RELEVANT REQUIREMENTS.

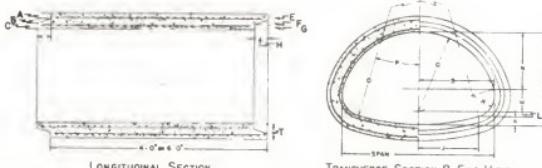
PLATED END TERMINAL SECTION WILL BE SECURED IN LENGTH OF PIPE BY WIRE OR PLATE.

STANDARD DRAWINGS	
REFERENCE:	DWG. NO. 47
STANDARD SPEC.	SECTION A-E
APPROVED:	RECORDED

RECORDED
EFFECTIVE 3/1/92 8:00PM

RECORDED
APPROVED
RECORDED



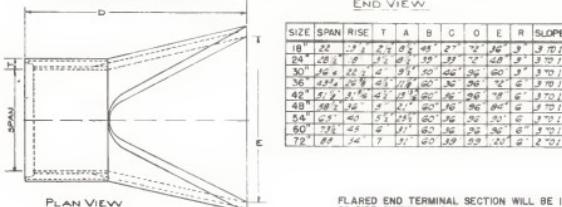
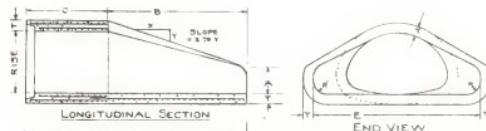


SIZE	WATER HEAD	SPAN/RISE	A ²	T	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
18	1-6	22'-0"	15'-0"	2'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	
24*	2-8	26'-0"	22'-0"	22'-0"	15'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	
30	4-4	30'-0"	22'-0"	22'-0"	15'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	22'-0"	
36	5-4	34'-0"	27'-0"	27'-0"	15'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	27'-0"	
42	6-4	38'-0"	32'-0"	32'-0"	15'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	32'-0"	
48	7-4	42'-0"	37'-0"	37'-0"	15'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	37'-0"	
54*	8-2	46'-0"	42'-0"	42'-0"	15'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	42'-0"	
60*	7-7	50'-0"	47'-0"	47'-0"	15'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	47'-0"	
72	25-6	68'-0"	54'-0"	54'-0"	15'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	54'-0"	

*As = MINIMUM REINFORCEMENT FOR EACH OF THE TWO LINES -
STEEL AREA IN SQUARE INCHES PER LINEAL FOOT OF PIPE.
BARREL, A SINGLE LINE WILL BE USED IN IR AND 24 SIZE.

CONCRETE STRENGTH IN TERMINAL SECTION SHALL BE EQUAL
TO MIN. STRENGTH SPECIFIED FOR BARREL SECTION.

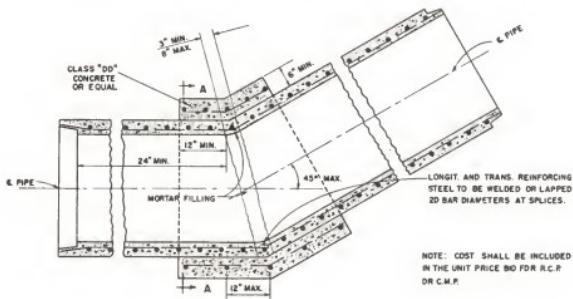
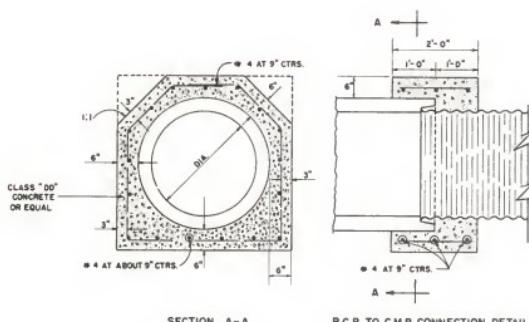
ASTM SPECIFICATIONS C-505 MAY TAKE PRECEDENCE OVER
DIMENSIONS SHOWN ABOVE SEE STANDARD SPEC. FOR OTHER
REQUIREMENTS.



FLARED END TERMINAL SECTION WILL BE INCLUDED IN LENGTH
OF PIPE SHOWN ON PLANS.

STANDARD DRAWING	
REFERENCE:	DWG NO.
STANDARD SPEC.	48
SECTION 63	
PREFABRICATED R.C.P. ARCH CULVERT AND TERMINAL SECTION	
REVISED	
EFFECTIVE	3/1/72
APPROVED	By <i>Architect</i>
ADMINISTRATOR - ENGINEERING DIVISION	



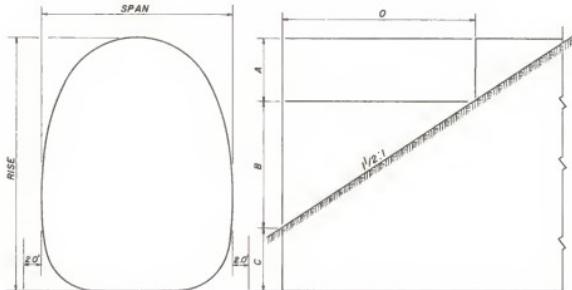


TYPICAL FIELD CAST CONCRETE BEND

STANDARD DRAWING	
REFERENCE:	DWG. NO. STANDARD SPEC. SECTION 54
TYPICAL FIELD CAST CONCRETE BEND R.C.P TO C.M.P. CONNECTION	
REVISED	EFFECTIVE
APPROVED BY <i>[Signature]</i>	ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72





DIMENSIONS

DESIGN	SPAN	RISE	THICK.	A \times	B \times	C \times	D \times
A	5'-10"	6'-6"	0.138"	1'-4"	3'-10"	1'-4"	5'-9"
B	5'-10"	7'-7"	0.138"	1'-8"	4'-7"	1'-4"	6'-10"

DESIGN "A" STOCKPASS: THE TOP OF THE STOCKPASS SHALL BE AN ARC HAVING A RADIUS OF NOT LESS THAN 26 INCHES OR MORE THAN 30 INCHES AND SHALL NOT BE LESS THAN 100° OR MORE THAN 130°. THE SIDES SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 60 INCHES OR MORE THAN 72 INCHES. CORNERS SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 17 INCHES OR MORE THAN 20 INCHES. THE BOTTOM SHALL BE A FLAT SEGMENT NOT LESS THAN 29 INCHES OR MORE THAN 34 INCHES IN WIDTH.

DESIGN "B" STOCKPASS: THE TOP OF THE STOCKPASS SHALL BE AN ARC HAVING A RADIUS OF NOT LESS THAN 24 INCHES OR MORE THAN 30 INCHES AND SHALL NOT BE LESS THAN 110° OR MORE THAN 155°. THE SIDES SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN B5 INCHES OR MORE THAN B2 INCHES. CORNERS SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 17 INCHES OR MORE THAN 20 INCHES. THE BOTTOM SHALL BE A FLAT SEGMENT NOT LESS THAN 29 INCHES OR MORE THAN 34 INCHES IN WIDTH.

* FOR DESIGN PURPOSES ONLY. BEVELING SHALL COMMENCE AT THE BOTTOM OF THE TOP PLATE AND EXTEND DOWNTWARD ON A 1/2:1 SLOPE TO THE TOP OF THE CORNER PLATE.

A TOLERANCE OF $\pm 4\%$ IN SPAN & RISE WILL BE ACCEPTABLE.

THE LENGTH SHALL BE MEASURED ALONG THE FLOW LINE OF THE STOCKPASS, END TO END OF STRUCTURE.

UNLESS OTHERWISE CALLED FOR, ENO PLATES SHALL BE BEVELED AS SHOWN ABOVE, AND SHALL BE MEASURED AND PAID FOR AT THE UNIT PRICE, B60 PER LINEAL FOOT OF STRUCTURAL PLATE PIPE STOCKPASS. WHEN ENDS ARE BEVELED, THE ANGLE OF SKEW SHALL NOT EXCEED 15° UNLESS OTHERWISE NOTED.

SEE STANDARD DRAWINGS CONCERNING BEDDING MATERIAL BENEATH THE STRUCTURE.

SEE STANDARD DRAWINGS CONCERNING RIPRAP WHEN TOE PROTECTION IS NECESSARY.

MINIMUM COVER = 2.0 FT. TO FINISH GRADE.

MAXIMUM COVER = 6.0 FT. TO FINISH GRADE.

FILL SLOPES SHALL BE warped A MINIMUM OF 25.0' ON EACH SIDE OF THE STOCKPASS TO FIT THE ENO BEVEL.

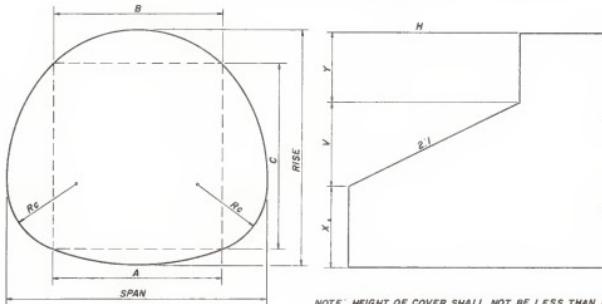
NOTE: INLET AND OUTLET ENO TREATMENT FOR ALL STOCKPASSES SHALL PROVIDE FOR CONCRETE EDGE PROTECTION, CUTOFF WALLS AND BACKFILL RETAINING WALLS. A GRAVEL SURFACE SHALL BE PROVIDED FOR THE INSIDE OF STRUCTURE. IF STRUCTURE IS USED FOR DUAL PURPOSE OF STOCK AND DRAINAGE, ASPHALT SURFACING SHALL BE PROVIDED. SURFACING TO BE SLANTED TO ALLOW A DRAINAGE COURSE ALONG ONE SIDE.

BOLTS FROM BOTTOM CORNER PLATES TO TOP OF STRUCTURE SHALL BE PLACED WITH BOLT HEAD ON INSIDE.

STANDARD DRAWING	
REFERENCE:	DWG. NO. 50
STANDARD SPEC.	SECTION 59
STRUCTURAL PLATE PIPE STOCKPASS	
REVISED	APPROVED
EFFECTIVE	3/1/72
BY <i>John P. Bellet</i> ADMINISTRATOR-ENGINEERING DIVISION	



NOTE: STRUCTURES OF A SIMILAR DESIGN MAY BE USED IF APPROVED BY THE ENGINEER.



NOTE: HEIGHT OF COVER SHALL NOT BE LESS THAN 5.0 FEET.

SPAN (FT.-IN.)	RISE (FT.-IN.)	A (FT.)	B (FT.)	C (FT.)	H (FT.)	V (FT.)	X (FT.)	Y (FT.)
12-2	11-0	10	B	B	10	5	3.709	2.291
13-10	12-2	10	B	10	10	5	3.82	3.347
14-10	14-0	12	10	10.5	10	5	3.87	5.13
15-8	15-0	12	10	12	10	5	3.957	6.043
16-5	16-0	12	10	13	12	6	3.828	6.172
17-3	17-0	12	10	14	12	6	4.756	6.244
19-1	17-2	16	12	13	12	6	4.794	6.373
20-4	17-9	16	12	14	12	6	4.785	6.965

SPAN (FT.-IN.)	RISE (FT.-IN.)	RADIUS R_C (IN.)	MINIMUM THICK. (IN.)	MAXIMUM HEIGHT OF COVER (FT.) *
12-2	11-0	3.8	0.109	17
13-10	12-2	3.8	0.109	15
14-10	14-0	3.8	0.109	14
15-8	15-0	3.8	0.109	12
16-5	16-0	3.8	0.138	12
17-3	17-0	4.7	0.138	11
19-1	17-2	4.7	0.168	10
20-4	17-9	4.7	0.188	10

TABLE BASED ON MINIMUM CORNER BEARING PRESSURE OF 2 TON/SQ.FT.

* FOR FILL HEIGHTS GREATER THAN MAXIMUM SPECIFIED, CONSULT MATERIALS BUREAU FOR SOIL BEARING STUDY.

NOTE: THESE STRUCTURES WILL BE DESIGNATED IN PLANS AND PROPOSAL AS "VEHICULAR UNDERPASS". MATERIALS, INSTALLATION AND OTHER PROVISIONS SHALL CONFORM TO THE STANDARD SPECIFICATIONS.

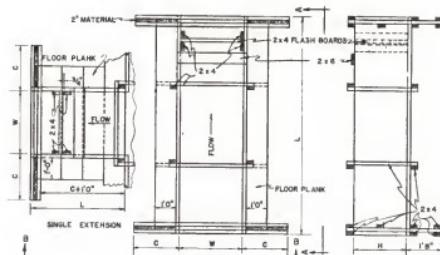
THE TERM "VEHICULAR UNDERPASS" WILL BE USED, REGARDLESS OF THE USE OR PURPOSE OF THE STRUCTURE.

INLET AND OUTLET END TREATMENT FOR ALL VEHICULAR UNDERPASSES SHALL PROVIDE FOR CORNER EDGE PROTECTION, CUTOFF WALLS AND BACKFILL RETAINING WALLS. SURFACING SHALL BE PROVIDED FOR THE INSIDE OF STRUCTURE. SURFACING TO BE SLOPED TO ALLOW A DRAINAGE COURSE ALONG ONE SIDE. BOLTS FROM BOTTOM CORNER PLATES TO TOP OF STRUCTURE SHALL BE PLACED WITH BOLT HEAD ON INSIDE.

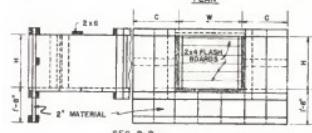
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	51
SECTION 59	
VEHICULAR UNDERPASS	
REVISED	4/1/79
EFFECTIVE	3/1/72 6/1/79
APPROVED BY <i>Jack D. Roberts</i> ADMINISTRATOR - ENGINEERING DIVISION	



WOODEN



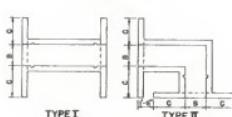
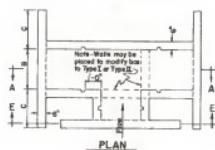
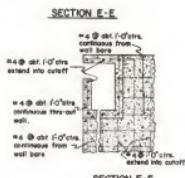
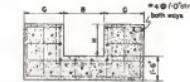
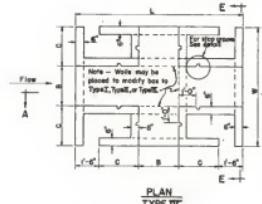
BFS AND FLOOR TO BE OF 543 MATCHED MATERIAL
DRILLED HOLES FOR NAILS
TO BE BALVED
WHERE NAILS ARE USED
TREATED LUMBER TREATMENT SHALL
BE IN ACCORDANCE WITH
THE REQUIREMENTS OF THE
TREATED LUMBER TREATMENT MUST
BE IN ACCORDANCE WITH
SUCH A MANUFACTURER WITH
LEAST ONE-FOURTH INCH



DIMENSIONS & MM LUMBER										
SINGLE BOX					SINGLE EXTENSION					
W	H	C	L	MM LUMBER	W	H	C	L	MM LUMBER	
10'	1' 6"	1' 6"	2' 9"	9' 0"	10'	1' 6"	1' 6"	3' 9"	3' 9"	
24'	2' 0"	2' 0"	5' 0"	11' 0"	390	2' 0"	2' 0"	3' 9"	4' 4"	165
10'	2' 0"	2' 0"	5' 0"	10' 0"	380	2' 0"	2' 0"	3' 9"	5"	223
30'	3' 0"	3' 0"	4' 6"	12' 0"	680	3' 0"	3' 0"	4' 6"	6' 0"	29

1 WAY - SINGLE BOX + ONE EXTENSION
3 WAY - SINGLE BOX + TWO EXTENSIONS

CONCRETE



DIMENSIONS & QUANTITIES									
TYPE	B	S	C	L	W	REINFORCING	QUANTITY	TYPE	TYPE
TYPE I	2' 0"	5' 0"	1' 6"	10' 0"	12'	1# 1/2" #6	1672	TYPE I	TYPE I
	2' 6"	5' 0"	1' 6"	10' 0"	12'	1# 1/2" #6	1672		
	3' 0"	5' 0"	1' 6"	10' 0"	12'	1# 1/2" #6	2052		
	2' 0"	5' 0"	1' 6"	10' 0"	2.0	1# 1/2" #6	160.0		
	2' 6"	5' 0"	1' 6"	10' 0"	2.6	1# 1/2" #6	160.0		
	3' 0"	5' 0"	1' 6"	10' 0"	3.5	1# 1/2" #6	230.8		
TYPE II	2' 0"	5' 0"	1' 6"	10' 0"	2.6	2# 1" #6	212.8	TYPE II	TYPE II
	2' 6"	5' 0"	1' 6"	10' 0"	3.4	2# 1" #6	258.4		
	3' 0"	5' 0"	1' 6"	10' 0"	4.6	2# 1" #6	349.6		
	2' 0"	5' 0"	1' 6"	10' 0"	5.5	2# 1" #6	288.0		
	2' 6"	5' 0"	1' 6"	10' 0"	4.2	2# 1" #6	382.4		
	3' 0"	5' 0"	1' 6"	10' 0"	5.1	2# 1" #6	425.6		

Note: Distance 6' 0" may be modified if desired by dimensions shown on the plans. Reinforcement and 6' 0" eccentric shall be included at unit price bid for concrete, also the required reinforcement.

Comments are for estimating purposes only.

STANDARD DRAWING

REFERENCE: OWE NO. 82

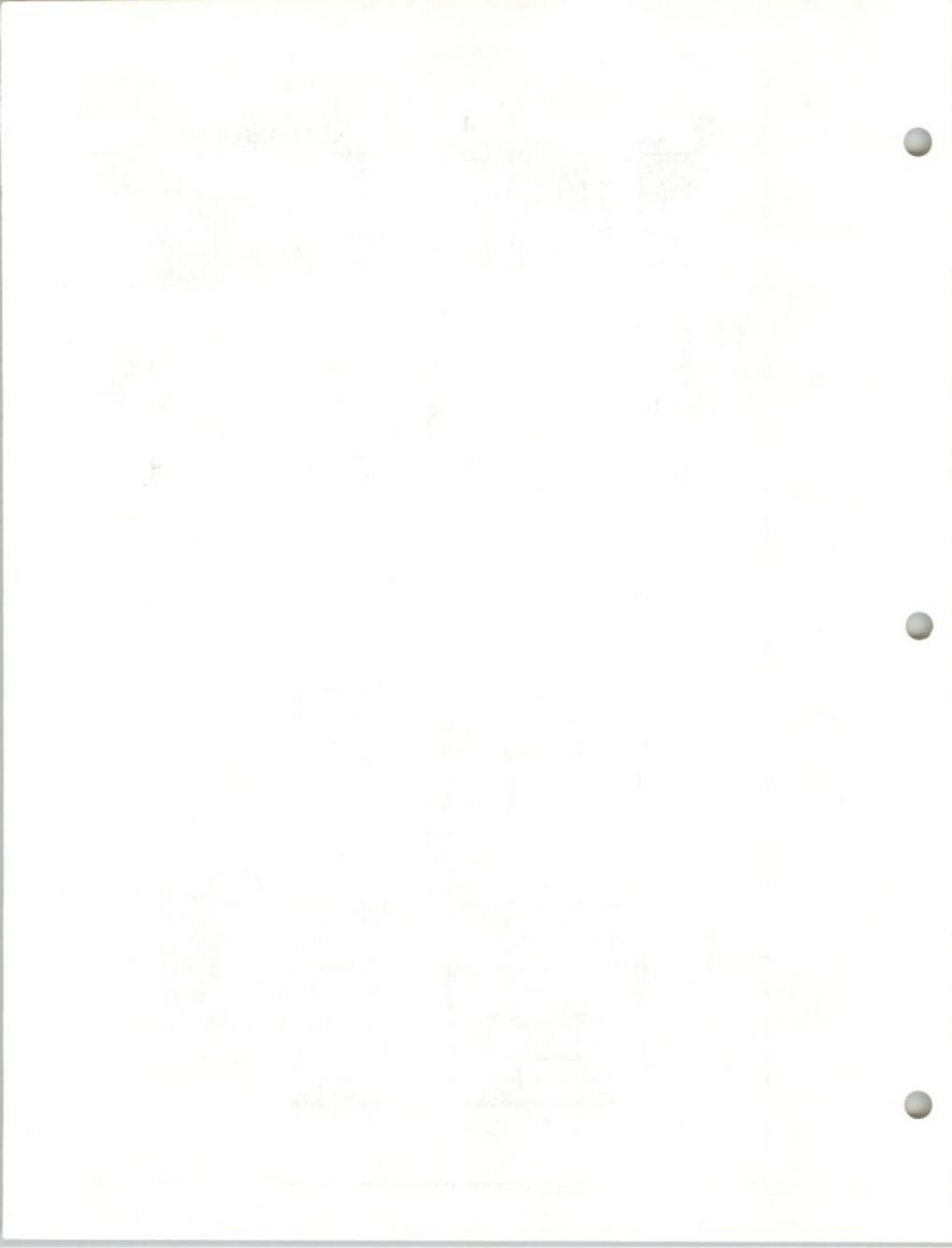
DESCRIPTION: FOUNDATIONAL

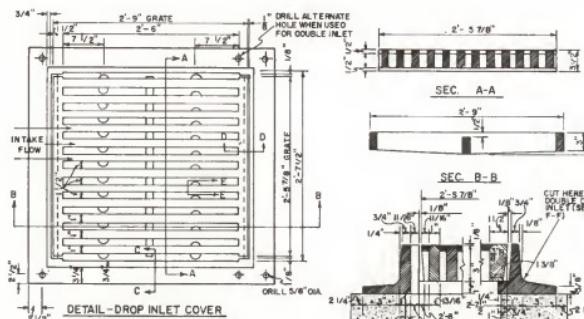
SECTION 75

STANDARD HIRSHMAN

DIVISION BOXES

REVISED
EFFECTIVE 3/1/82
DRAFTED BY D. D. HILL
AMERICAN STANDARD BUILDING



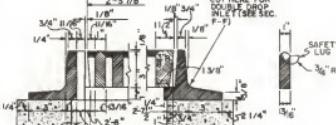


NOTE: ALL CONCRETE TO BE CLASS "D" OR EQUAL.
USE STAINLESS STEEL REINFORCING.
CONC. GROUTERS WILL DESIGN TO FIT
SPECIFIC CONDITIONS. SEE PLANS FOR
DETAILS & QUANTITIES. USE LOCAL STDS
WHERE AVAILABLE.

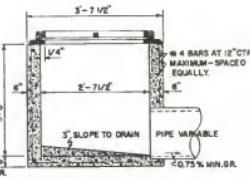
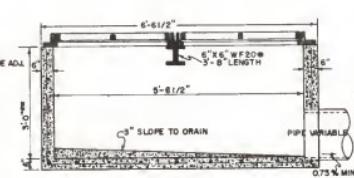
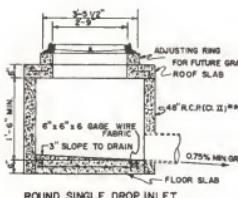
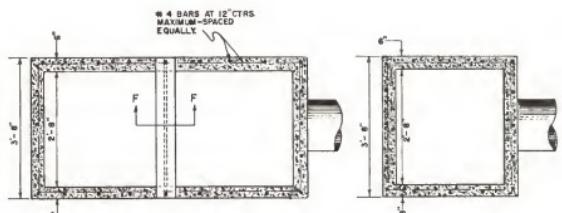
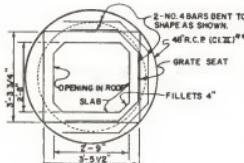
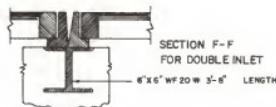
* QUANTITIES

	CONCRETE	REIN. STL.
TYPE I	15 CU. YDS.	40 LBS.
TYPE II	10 CU. YDS.	90 LBS.
TYPE III	15 CU. YDS.	145 LBS.

*QUANTITIES ARE FOR ESTIMATING ONLY.



SECTION F-F
FOR DOUBLE INLET



TYPE I

TYPE II

TYPE III

** STANDARD EXCEPT AS OTHERWISE NOTED ON PLANS.

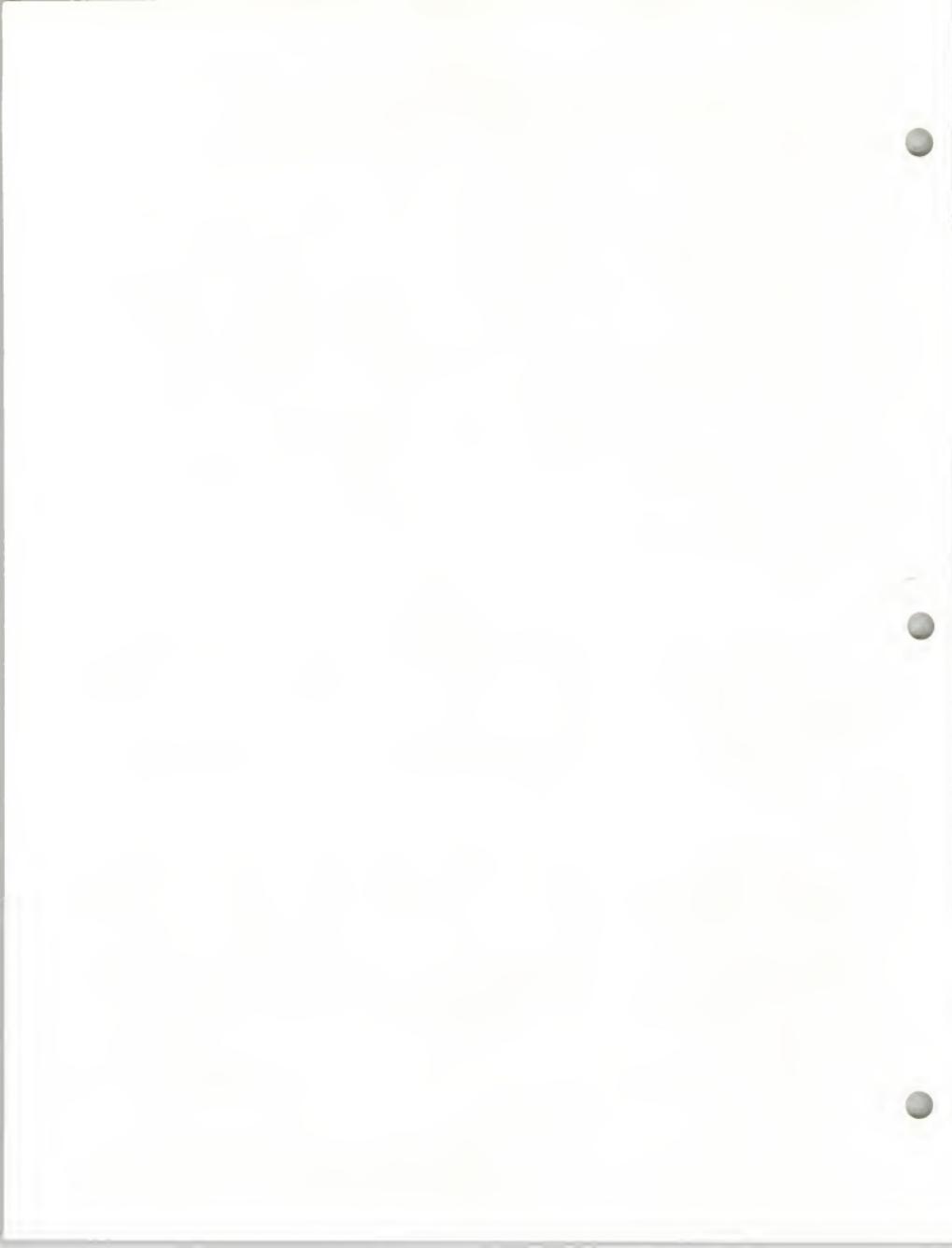
STANDARD DRAWING	
REFERENCE STANDARD SPEC. SECTION 77	DWG NO. 53

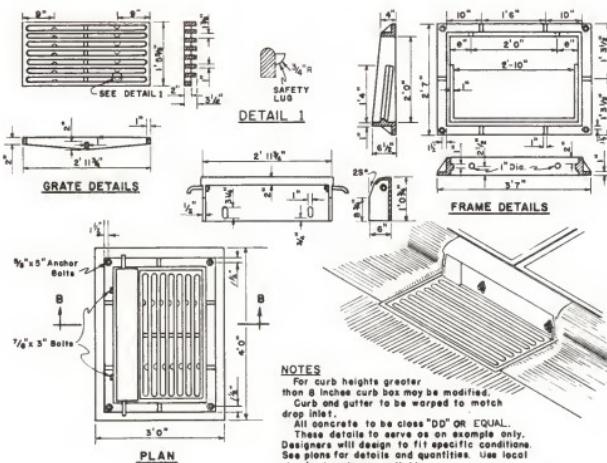
DROP INLETS AND COVERS

REVISED	2/15/73	4/1/79
EFFECTIVE	3/1/73	6/1/79

APPROVED
Joseph P. Belotti

ADMINISTRATOR - ENGINEERING DIVISION



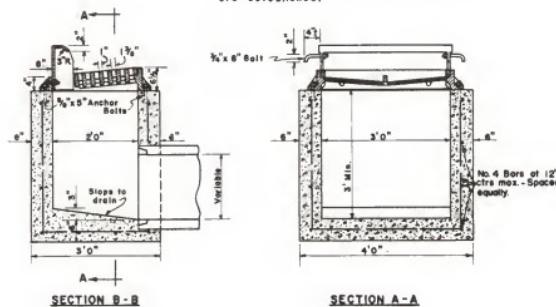


NOTES

For curb heights greater than 8 inches curb box may be modified. Curb and gutter to be warped to match grade of curb.

All concrete to be class "DD" OR EQUAL. These details to serve as an example only. Designer will design to fit specific conditions. See notes for specific quantities. Use local standards where available.

After placement of curb box, the adjustment slots may be filled to supply bearing to bolts. If required, slot heads, or bolt holes may be drilled in curb box after grades are established.



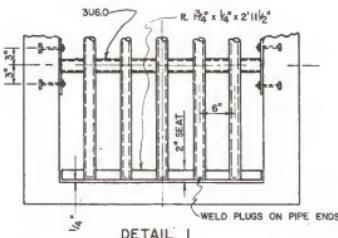
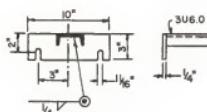
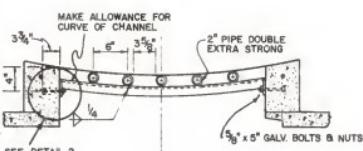
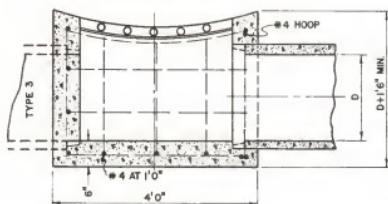
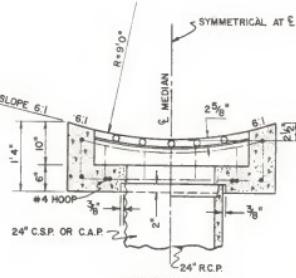
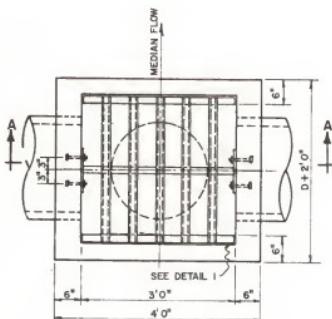
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	54
SECTION 77	
CURB INLET BOX AND COVER	
REVISED	4/1/72
EFFECTIVE	3/1/72
APPROVED	J. P. R.
BY ADMINISTRATOR - ENGINEERING DIVISION	

REVISED 4/1/72
EFFECTIVE 3/1/72

APPROVED J. P. R.
BY ADMINISTRATOR - ENGINEERING DIVISION



NOTE: WHEN MEDIAN INLET COVER IS INSTALLED OVER PIPES LARGER THAN 36", WITHOUT ADEQUATE COVER TO PERMIT THE USE OF TYPE I INSTALLATION, A DETAIL DRAWING OF THE INSTALLATION SHALL BE PROVIDED IN THE PLANS.



DETAIL 2

* GRATE AND REINF STEEL		
	24"	30"
TYPE 1	50 LBS	—
TYPE 2	85 LBS	95 LBS
TYPE 3	85 LBS	95 LBS
GRATE	165 LBS	185 LBS
	210 LBS	

* QUANTITIES LBS ARE FOR ESTIMATING PURPOSES ONLY TYPE 3 WILL BE A SPECIAL CASE TO BE FIGURED FOR THE PARTICULAR INSTALLATION.

* CL "DD" CONC. OR EQUAL		
	24"	30"
TYPE 1	.5 CU YDS	—
2	9 CU YDS	1.1 CU YDS
3	9 CU YDS	1.1 CU YDS

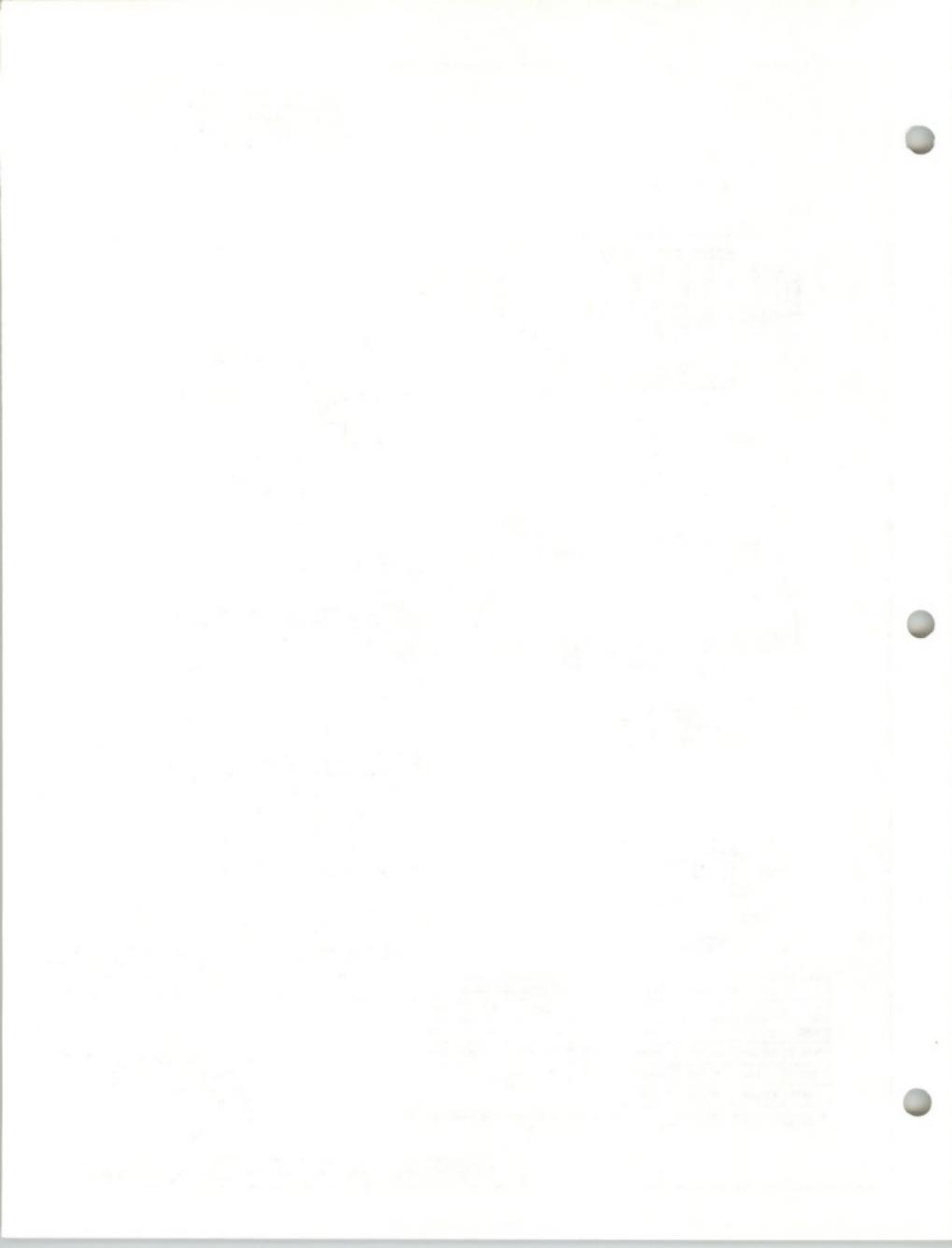
NOTES: ALL EXPOSED METAL PARTS TO BE PAINTED WITH ONE COAT OF RED LEAD AND TWO COATS OF ALUMINUM PAINT.
UNIT PRICE BID FOR MEDIAN INLET COVER SHALL INCLUDE PAYMENT FOR THE CONCRETE, REINFORCING STEEL, GRATE, AND ADDITIONAL EXCAVATION, COMPLETE IN PLACE.

STANDARD DRAWING
REFERENCE: STANDARD SPEC. DWG. NO. 55
SECTION 77

MEDIAN INLET COVER

APPROVED BY *Jack R. Robert*
ADMINISTRATOR-ENGINEERING DIVISION

REVISED 3/1/72
EFFECTIVE

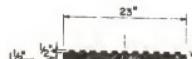




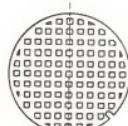
DETAIL
CATCH BASIN COVER



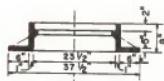
CATCH BASIN COVER



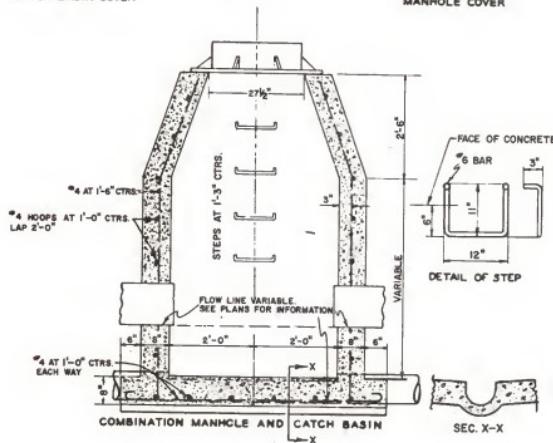
DETAIL
MANHOLE COVER



MANHOLE COVER

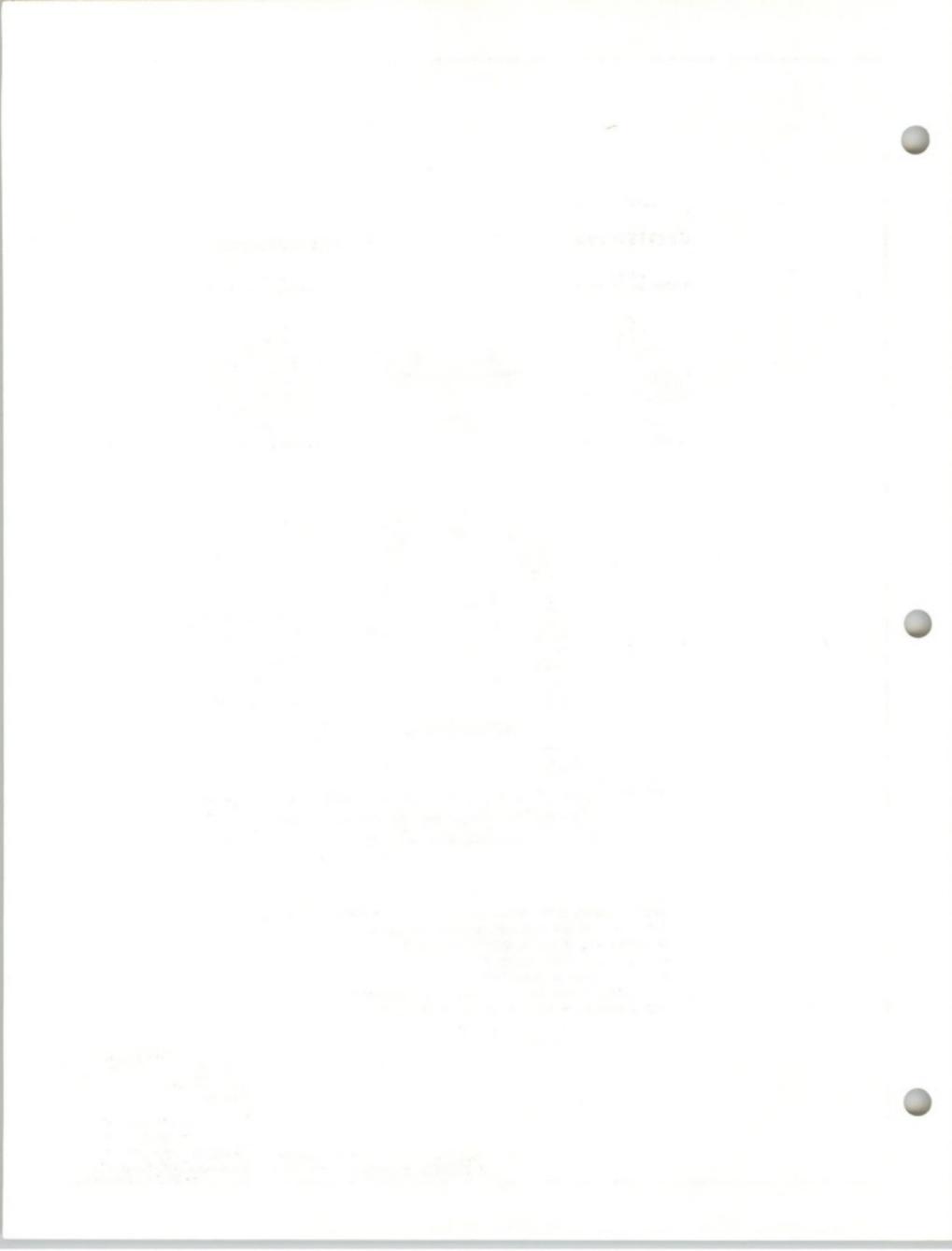


DETAIL
CASTING

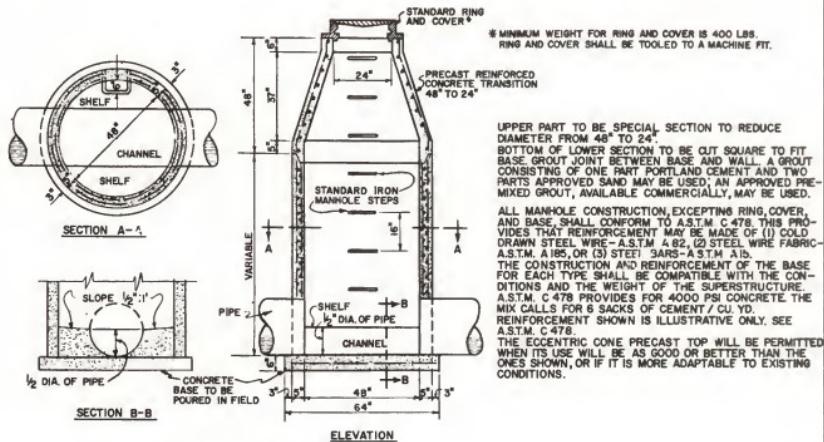


WALLS OF MANHOLE OR CATCHBASIN MAY BE EITHER CONCRETE OR CEMENT BLOCKS.
THE DETAILS SHOWN HERE ARE TO SERVE AS AN EXAMPLE.
DESIGNERS WILL DESIGN TO SPECIFIC CONDITIONS.
USE LOCAL STANDARDS WHERE AVAILABLE.
ALL CONCRETE TO BE CLASS "DD" OR EQUAL.
THE COVER AND RING SHALL BE TOOLED TO A MACHINE FIT.
THIS STRUCTURE IS INTENDED TO BE CAST IN PLACE.

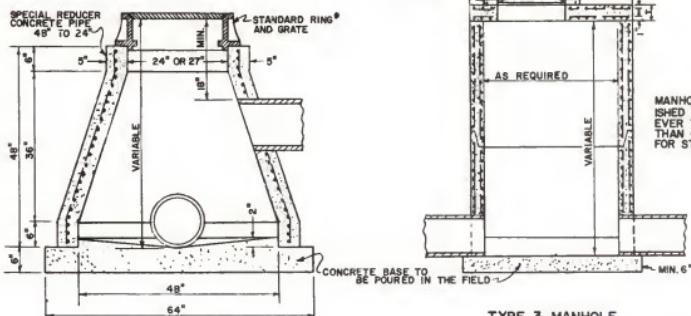
STANDARD DRAWING	
REFERENCE:	DWG NO. 56
STANDARD SPEC.	
SECTION 77	
COMBINATION MANHOLE AND CATCH BASIN	
APPROVED By <i>Frank P. Reiter</i>	
REVISED EFFECTIVE 3/1/72	ADMINISTRATOR - ENGINEERING DIVISION



ANY OTHER TYPE OF MANHOLE REQUIRED WILL BE
DESIGNED AND DESIGNATED AS "SPECIAL MANHOLE".

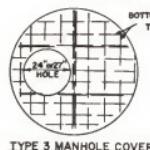


TYPE I MANHOLE



TYPE 2 MANHOLE

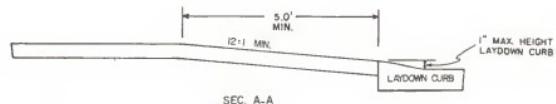
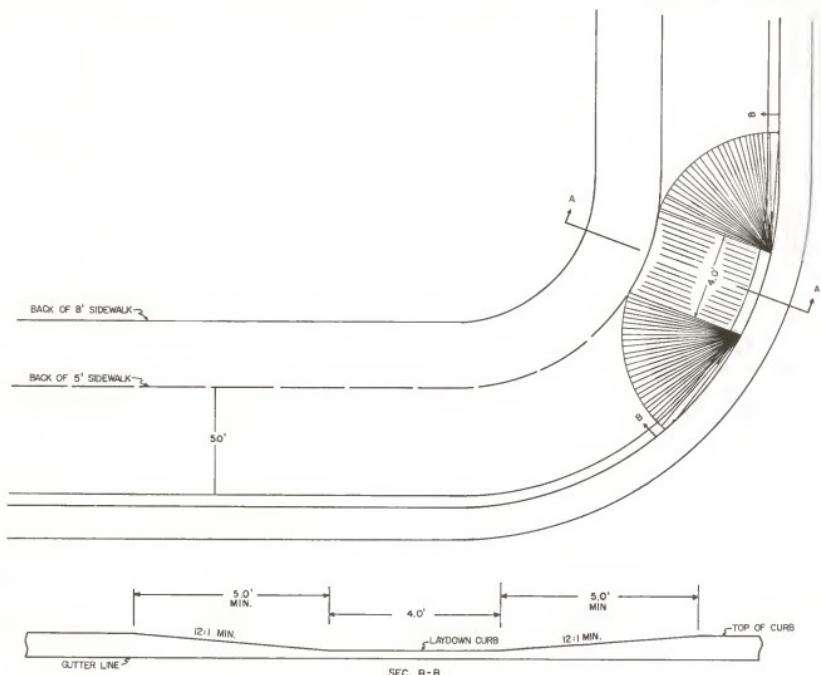
TYPE 3 MANHOLE COVER			
Pipe Dia.	Dia. Cover	T	E
48	55	6	8
54	62	6	9
60	69	6	9
66	75	8	7
72	86	8	8



STANDARD DRAWING	
REFERENCE:	DWG. NO. 57
STANDARD SPEC.	SECTION 77
PRECAST CONCRETE MANHOLE	
REVISED	12/1/72
EFFECTIVE	12/1/72

REVISED	12/1/72
EFFECTIVE	12/1/72
APPROVED	Richard P. [Signature]
ADMINISTRATOR - ENGINEERING DIVISION	





NOTES:

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOMING, TRANSVERSE TO THE SLOPE OF THE RAMP.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP; FREE OF SAW DUST AND SHARP EDGES.

IF POSSIBLE, DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH THE NEW CONSTRUCTION; LOCATION OF THE RAMP SHOULD TAKE PREDENCE OVER LOCATING DRAINAGE STRUCTURE.

THE NORMAL GUTTER LINE PROFILE SHALL BE MAINTAINED THROUGH THE AREA OF THE RAMP.

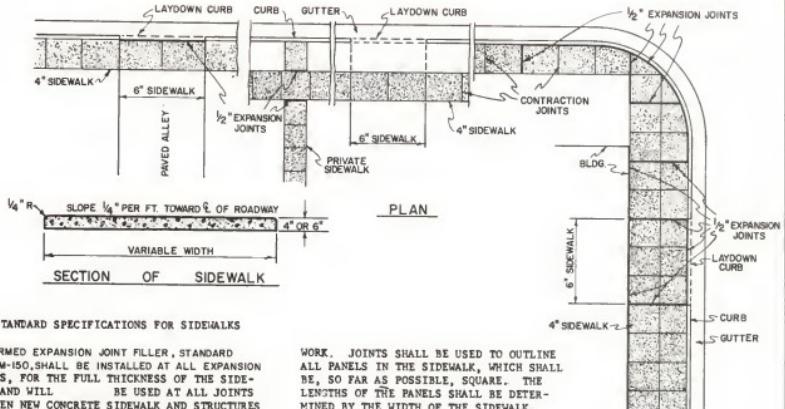
CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHOULD RAMP CROSSING.

WHEEL CHAIR RAMPS SHALL BE INSTALLED WITH ALL NEW SIDEWALKS. THE LOCATION OF WHEEL CHAIR RAMPS SHALL BE DETERMINED BY THE ENGINEER.

NO SLOPE SHALL EXCEED 1¹:1 (12:1) ON THE RAMP OR SIDEWALK.

STANDARD DRAWING	
REFERENCE: STANDARD SPEC. SECTION 76	DWG. NO. 64
WHEELCHAIR RAMP	
REVISED EFFECTIVE 6/1/79	APPROVED By Jack K. [Signature] ADMINISTRATOR-ENGINEERING DIVISION





SEE STANDARD SPECIFICATIONS FOR SIDEWALKS

PREFORMED EXPANSION JOINT FILLER, STANDARD SPEC M-150, SHALL BE INSTALLED AT ALL EXPANSION JOINTS, FOR THE FULL THICKNESS OF THE SIDEWALK AND WILL BE USED AT ALL JOINTS BETWEEN NEW CONCRETE SIDEWALK AND STRUCTURES IN PLACE. PREFORMED EXPANSION JOINT FILLER SHALL BE INCLUDED IN THE UNIT PRICE BID PER SQUARE YARD FOR CONCRETE SIDEWALK.

ALL JOINTS SHALL BE STRAIGHT AND PERPENDICULAR TO THE CENTERLINE AND THE SURFACE OF THE SIDEWALK. ALL JOINTS, WHERE PRACTICABLE, SHALL ALIGN WITH LIKE JOINTS IN ADJOINING

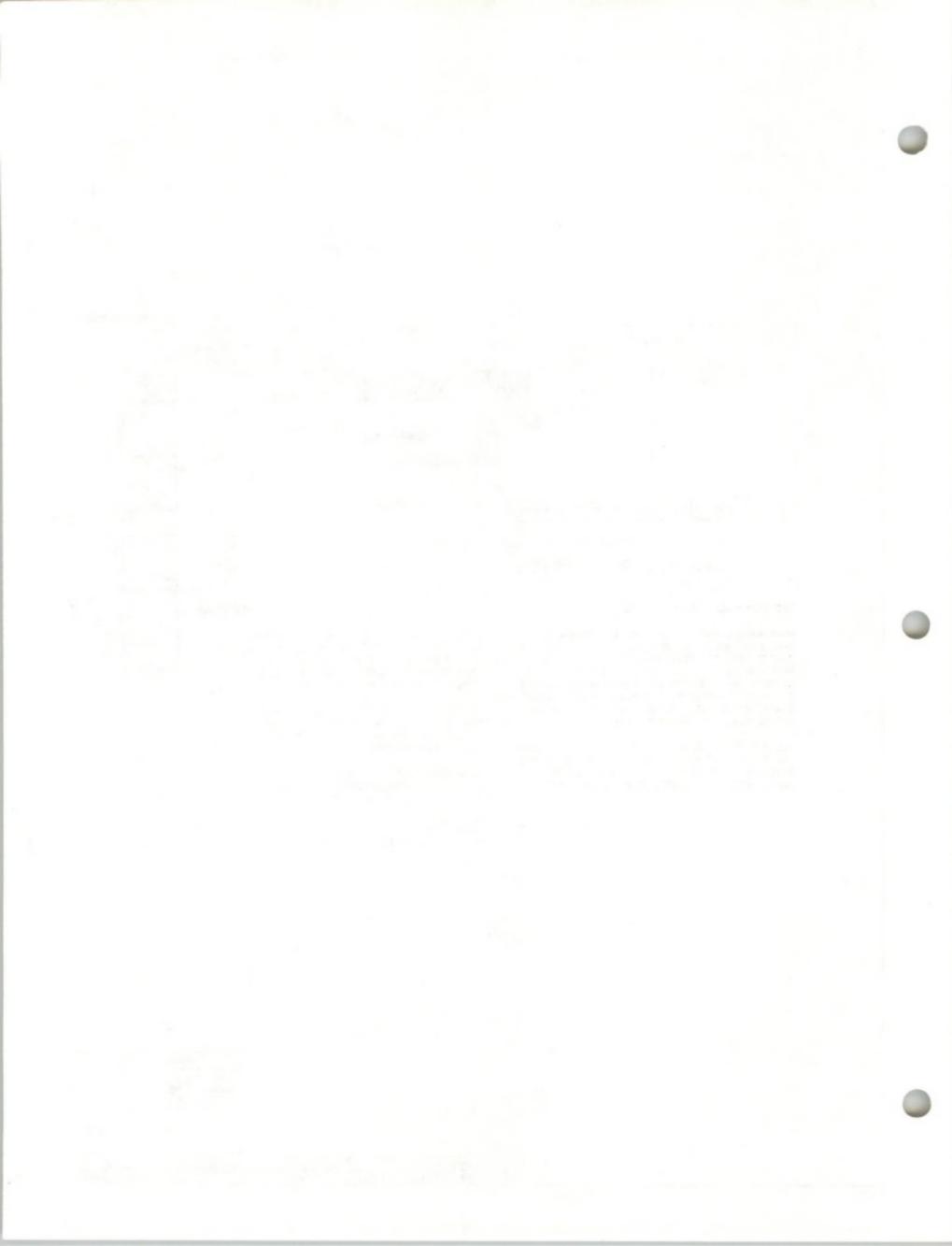
WORK. JOINTS SHALL BE USED TO OUTLINE ALL PANELS IN THE SIDEWALK, WHICH SHALL BE, SO FAR AS POSSIBLE, SQUARE. THE LENGTHS OF THE PANELS SHALL BE DETERMINED BY THE WIDTH OF THE SIDEWALK.

CONTRACTION JOINTS SHALL BE NOT MORE THAN 1/8 INCH WIDE AND NOT LESS THAN 1 INCH IN DEPTH AND MAY BE CUT BY A GROOVE FORMING TOOL.

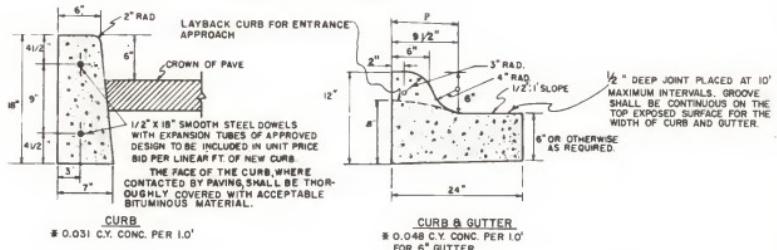
EXPANSION JOINTS AT THE NEAREST MULTIPLE OF THE CONTRACTION JOINT INTERVAL BUT NOT TO EXCEED 60 FEET.

ALL SIDEWALKS WIDER THAN 5 FEET SHALL HAVE A LONGITUDINAL CONTRACTION JOINT IN THE CENTERLINE OF THE SIDEWALK.

STANDARD DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	65
SECTION 76	
CONCRETE SIDEWALK	
REVISED	4/1/79
EFFECTIVE	3/1/72 6/1/79
APPROVED	<i>R. Bondurant</i>
ADMINISTRATOR-ENGINEERING DIVISION	



CONCRETE CURBS



JOINTS:

(A) Where deftly tied to pavement slab.

Separate curb or integral curb and gutter shall have the expansion joint of the pavement slab extended through and shall be completely filled with a minimum of $\frac{1}{2}$ " of preformed expansion joint filler. Steel dowels shall be inserted with expansion tubes at each joint.

(B) Where not tied to pavement slab.

Separate curb or integral curb and gutter shall have through joints at predetermined intervals filled with a minimum of $\frac{1}{2}$ " width of preformed expansion joint filler. Such joint intervals shall be determined by dividing the distance between curb returns with such intervals to be less than 60 feet and greater than 60 feet. Preformed expansion joint filler shall be placed at all curb returns, bridges, drop inlets and where meeting curb and gutter in place.

Contraction joints in the curb and gutter shall be spaced at 10 foot intervals. These joints shall be $\frac{1}{8}$ " maximum width and constructed to a minimum depth of $\frac{1}{4}$ ". Contraction joints shall be constructed by sawing or scoring. When scoring a tool shall be used which will leave the curbs rounded and destroy aggregate interlock to the depth specified for sawing of the joint.

(C) A minimum $\frac{1}{4}$ " width of preformed expansion joint filler shall be placed between the curb or gutter and any concrete pavement slab.

(D) A minimum $\frac{1}{2}$ " width of preformed expansion joint filler shall be placed between the curb and sidewall, as shown on Std Dwg No 65.

(E) Preformed expansion joint filler shall comply with requirements of Standard Spec. M-130.

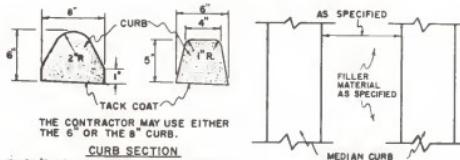
RADI:
Minimum curb return radii - 10'

15' radii desirable for streets

CONCRETE:

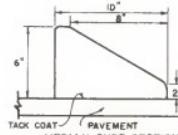
Unless otherwise specified, concrete curbs and concrete integral curbs and gutters shall be constructed of air-entrained class "D" concrete or equal.

BITUMINOUS CURBS



ALL MATERIALS AND CONSTRUCTION TO CONFORM TO STANDARD SPECIFICATIONS FOR BITUMINOUS CURB.

* QUANTITIES FOR ESTIMATING PURPOSES ONLY.



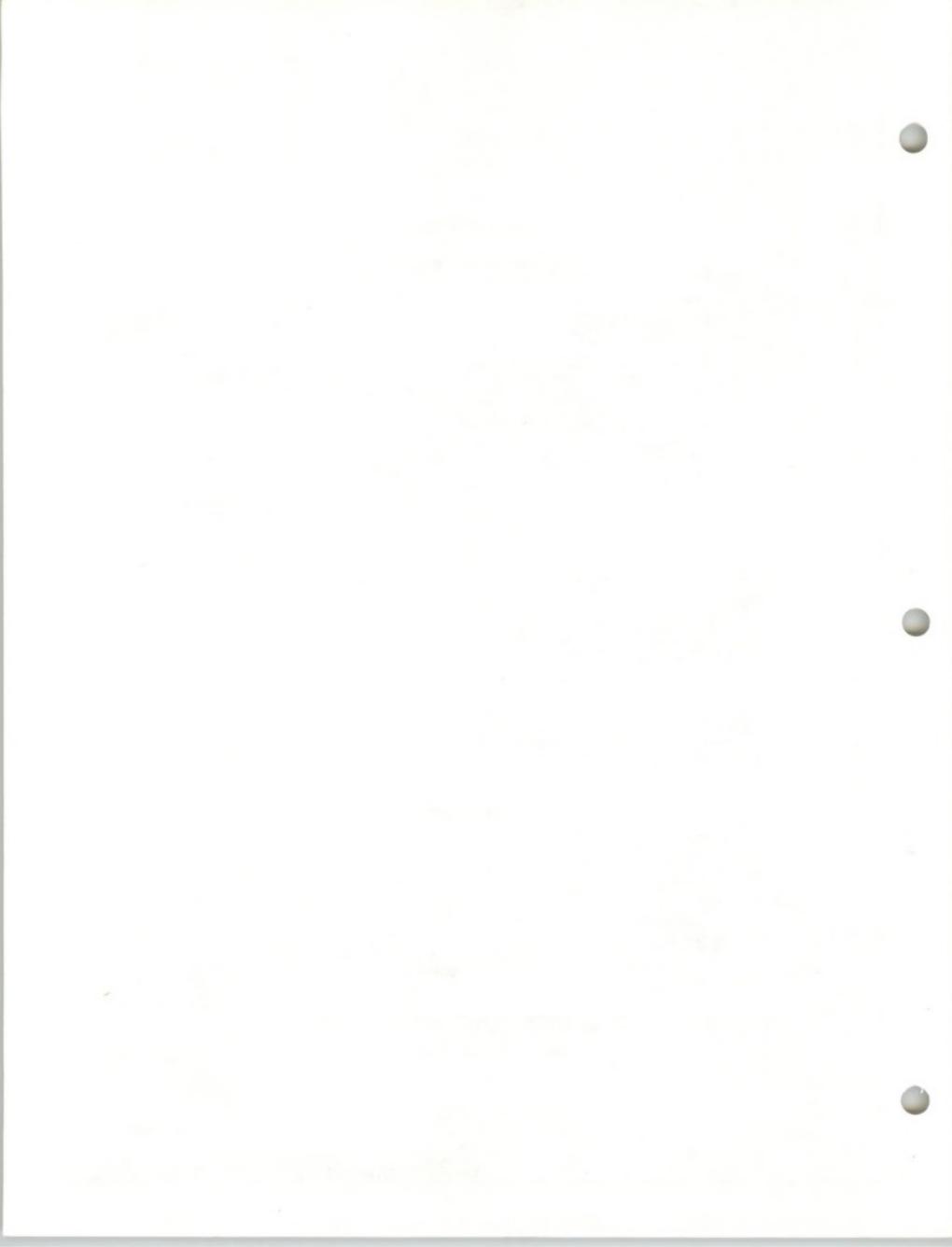
1 CU. FT. OF MATERIAL WILL MAKE ABOUT 3.5 LINEAR FT. OF CURB.

STANDARD DRAWING	
REFERENCE:	DWG. NO. STANDARD SPEC. SECTION 75
STANDARD CURBS	
REVISED	12/20/74
EFFECTIVE	3/1/72
APPROVED	<i>P. R. L.</i>
	ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE

12/20/74
3/1/72

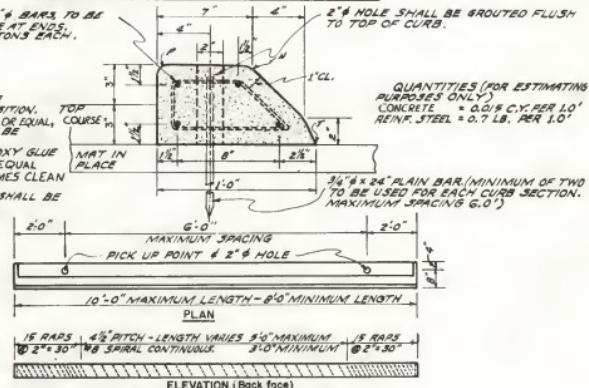
4/1/79
6/1/79



PRECAST-PRESTRESSED CONCRETE CURB (TYPE "A")

REINFORCE WITH 4 - 1/4" BARS. TO BE CUT 1/2" BACK FROM FACE AT ENDS.
JACKING LOAD = 3.1 TONS EACH.

NOTES:- CURBS TO BE CAST IN INVERTED POSITION.
CLASS "D" CONCRETE OR EQUAL.
TYPICAL COURSE TO BE USED THROUGHOUT.
PATCH HOLE WITH EPOXY GLUE
TRETTOL NO. 7385 OR EQUAL
MIX ONE FOUR VOLUMES CLEAN
SHARP SAND.
ALL EXPOSED EDGES SHALL BE
ROUNDED 3/8" RADIUS.
CONCRETE = 4000 PSI
@ TRANSFER.

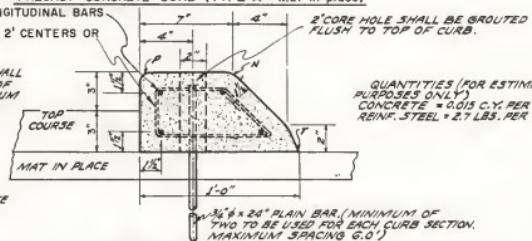


PRECAST CONCRETE CURB (TYPE "A"- Mat in place)

REINFORCE WITH 4 - 4 LONGITUDINAL BARS
W 15 OR LARGER WIRE AT 2' CENTERS OR APPROVED CHAIR METHOD

NOTES:
CURBS SHALL BE PRECAST A MINIMUM OF 4' LENGTH AND A MAXIMUM OF 10' LENGTHS.
ALL EXPOSED EDGES SHALL BE ROUNDED 3/8" RADIUS.

TYPES "A" & "B"
CONCRETE SHALL BE CLASS "D" OR CONCRETE OF EQUAL STRENGTH.



PRECAST CONCRETE CURB (TYPE "B"- Future mat)

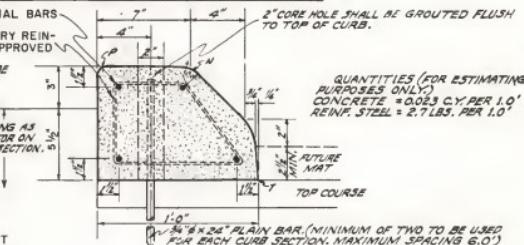
REINFORCE WITH 4 - 4 LONGITUDINAL BARS
TIE W 15 OR LARGER WIRE TO EVERY REINFORCING BAR AT 2' CENTERS OR APPROVED CHAIR METHOD

NOTES:
CURBS SHALL BE PRECAST A MINIMUM OF 4' LENGTHS AND A MAXIMUM OF 10' LENGTHS.

ALL EXPOSED EDGES SHALL BE ROUNDED 3/8" RADIUS.

SURFACING AS CALLED FOR ON TYPICAL SECTION.

NOTE: REINFORCING STEEL IS NOT REQUIRED IF CONCRETE CURB IS CAST IN PLACE.



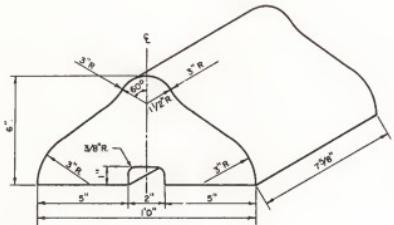
STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 67
SECTION 75

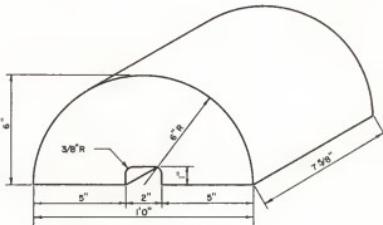
APPROVED

B. John D. Rehfeld
EFFECTIVE 3/11/72 APPROVED 10/20/74 4/1/75
EXPIRED 2/11/75 6/1/79 ADMINISTRATOR - ENGINEERING DIVISION

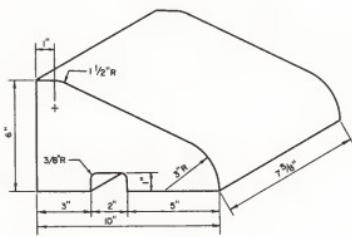




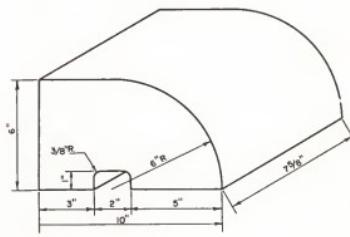
TYPE I BLOCK



TYPE I REFLECTOR BLOCK



TYPE II BLOCK

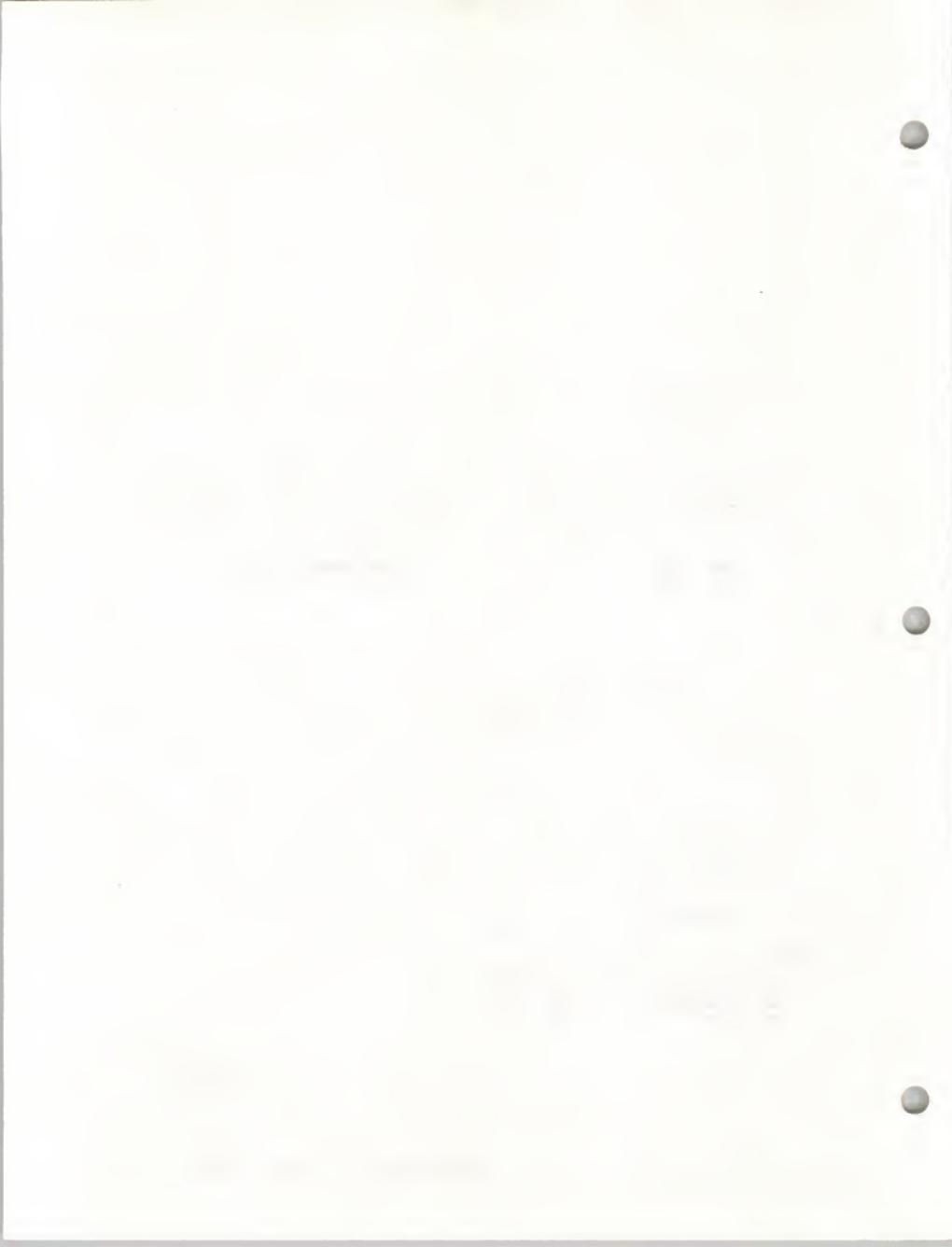


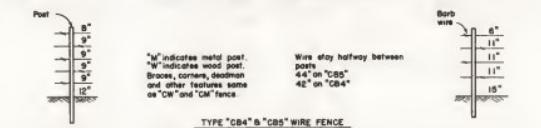
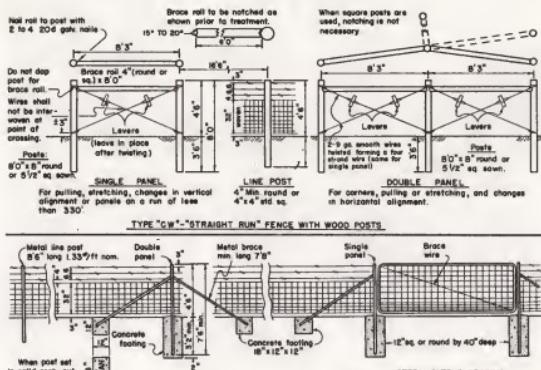
TYPE II REFLECTOR BLOCK

NOTES:

- Every sixth block shall be a reflector block, unless otherwise specified.
- Concrete shall be Class "D0" or concrete of equal strength.
- Blocks shall be set with approved Portland cement grout or with an approved adhesive agent.

STANDARD DRAWING	
REFERENCE :	DWG. NO.
STANDARD SPEC.	68
SECTION 7B	
PRECAST TRAFFIC CURBS	
REVISED	EFFECTIVE
	3/1/72
APPROVED	
<i>[Signature]</i>	
ADMINISTRATOR - ENGINEERING DIVISION	

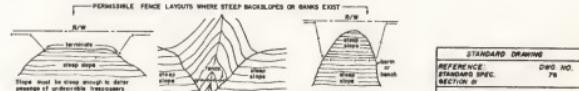
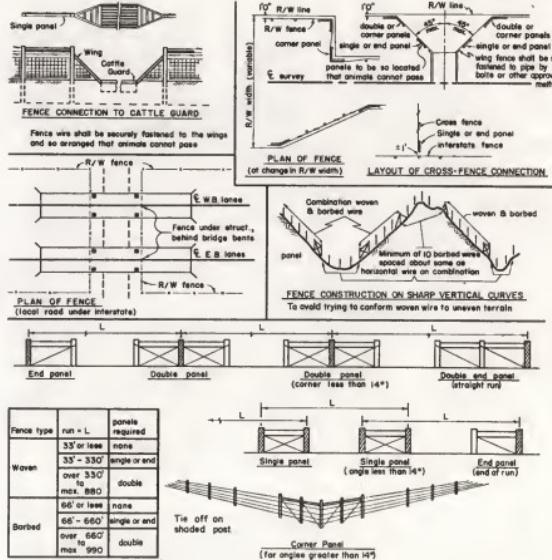




NOTES:

- All fence wire to be placed on pasture side of post except curves, the wire shall be placed on the outside of the curve. In areas subject to high velocity winds and moving debris, wires may all be placed on windward side of posts. Except on curves.
- All concrete shall be class "F" or better.
- Maximum bow in wood posts-- $\frac{1}{2}$ " in 7'.

Post spacing measured generally parallel to ground
Line post shelf normally be spaced 16' 6" apart Also 16' 6"
from brace or panel posts.
2x4 wire stay to be placed halfway between posts, excepting
panels on "CM" and "CW" fence
Fence with wooden posts to have one metal post, in place
of a wooden line post, in each 500' run for lighting protection.

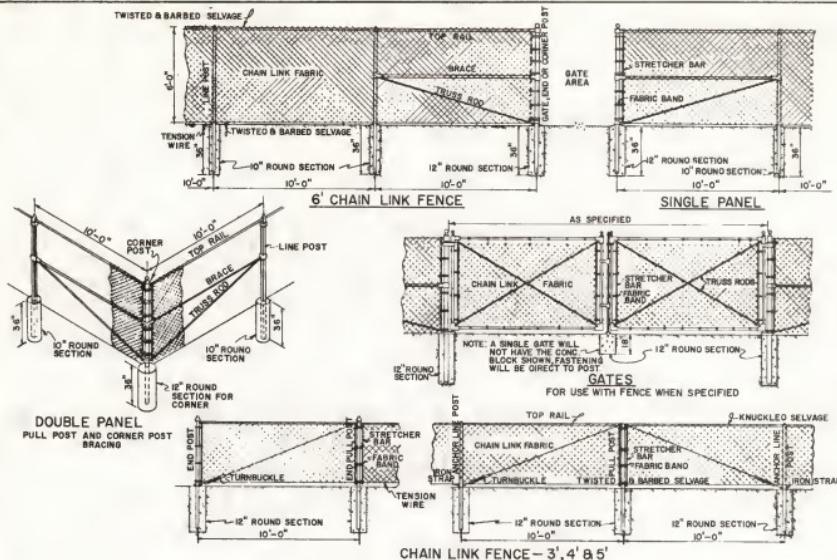


Fence type	run = L	panels required
Woven	33' or less	none
	33' - 330'	single or end
	over 330'	double
	to max. 990'	double
Barbed	66' or less	none
	66' - 660'	single or end
	over 660'	double
	to max. 990'	double

REVISED _____ EFFECTIVE 3/1/72 APPROVED Jed R. Burt
ADMINISTRATOR - External Affairs Division

STANDARD DRAWINGS
REFERENCE: DB
STANDARD SPEC.
SECTION B
WIRE FENCE





A SINGLE PANEL SHALL BE PLACED AT EVERY END OF CHAIN LINK FENCE. SEE SPECIFICATIONS FOR MATERIALS.

SEE STANDARD SPECIFICATIONS FOR FURTHER REQUIREMENTS.

GATES ARE INCLUDED ON THIS STANDARD FOR USE IN SPECIAL CASES ONLY. THEY SHALL NOT BE INSTALLED AT ANY LOCATION UNLESS SPECIFIED BY THE ENGINEER.

LINER POSTS ON 3 FOOT AND 4 FOOT FENCE SHALL BE DRIVEN OR SET IN CONCRETE AS FIELD CONDITIONS WARRANT. THE TWO POSTS ADJACENT TO THE PULL POST SHALL BE SET IN CONCRETE.

PULL POST BRACING ON 6 FOOT FENCE SHALL BE SAME AS CORNER BRACING SHOWN IN DETAIL UPPER LEFT.

ALL CONCRETE IS CLASS "P" OR BETTER.

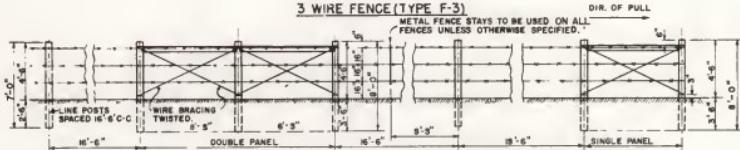
DOUBLE PANELS SHALL BE INSTALLED NO MORE THAN 300 FEET APART ON TANGENTS AND USED FOR PULLING. SUCH PANELS SHALL BE PLACED AT EACH END OF EACH CURVE SHARPER THAN 5° AND BE APPROXIMATELY EVENLY SPACED BETWEEN, ABOUT 20° OF CENTRAL ANGLE (10° DEFLECTION) APART, BUT NOT MORE THAN 250 FEET APART ON ANY CURVE. SEE SPECIFICATIONS FOR MATERIALS.

HEIGHT OF FABRIC	WIRE FABRIC ABOVE GROUND	DEPTH OF CONCRETE	POST IN CONC.(MIN.)
6'	1'-2"	36"	32"
5'	1'-2"	36"	32"
4'	1'-2"	30"	26"
3'	1'-2"	30"	26"

STANDARD DRAWING			
REFERENCE:	STANDARD SPEC.	DWG. NO.	76
SECTION #0			
CHAIN LINK FENCE			
REVISED	4/1/79	EFFECTIVE	3/1/72
APPROVED	<i>John R. Bush</i>	ADMINISTRATOR	ENGINEERING DIVISION
6/1/79			



3 WIRE FENCE (TYPE F-3)

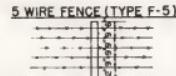


4 WIRE FENCE (TYPE F-4)

ALL WIRE SPACING SHOWN IS APPROXIMATE

FOR PANEL DETAILS SEE STD. DWG. 75

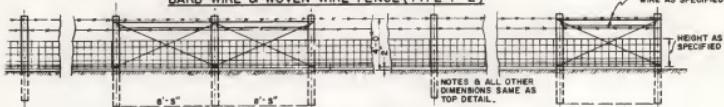
5 WIRE FENCE (TYPE F-5)



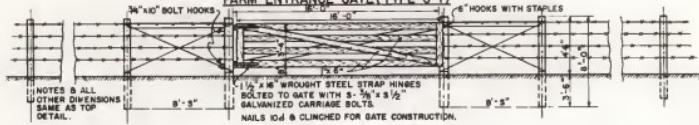
6 WIRE FENCE (TYPE F-6)



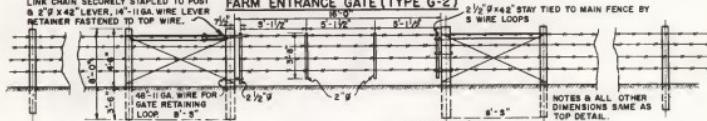
BARB WIRE & WOVEN WIRE FENCE (TYPE F-2)



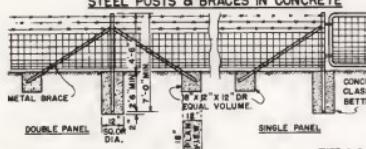
FARM ENTRANCE GATE (TYPE G-1)



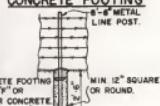
FARM ENTRANCE GATE (TYPE G-2)



STEEL POSTS & BRACES IN CONCRETE



CONCRETE FOOTING



FOR DETAILS OF FENCE PANELS SEE STANDARD DRAWING NO. 75

NOTE:

A DEAD MAN MAY BE A CONCRETE BLOCK, A CAST-IN-PLACE CONCRETE BLOCK, A ROCK OR OTHER APPROVED OBJECT, WEIGHING AT LEAST 150 LBS., AND COVERED AT LEAST 2 FEET

NOTE: (STEEL POSTS)

EACH CORNER, END GATE, OR FULL POST AND EACH BRACE SHALL BE SET IN CONCRETE AND BRACED AS INDICATED.

USE 18" GATE UNLESS R/W AGREEMENT STATES OTHERWISE.

ON TYPE G-2 FARM GATE, MATERIAL SHALL BE THE SAME AS NEW FENCE.

STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION 81

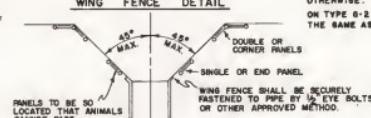
DWG. NO. 78

FARM FENCE

REVISED	10/20/74	4/1/79
EFFECTIVE	3/1/72	6/1/79

APPROVED: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

WING FENCE DETAIL



REVISED

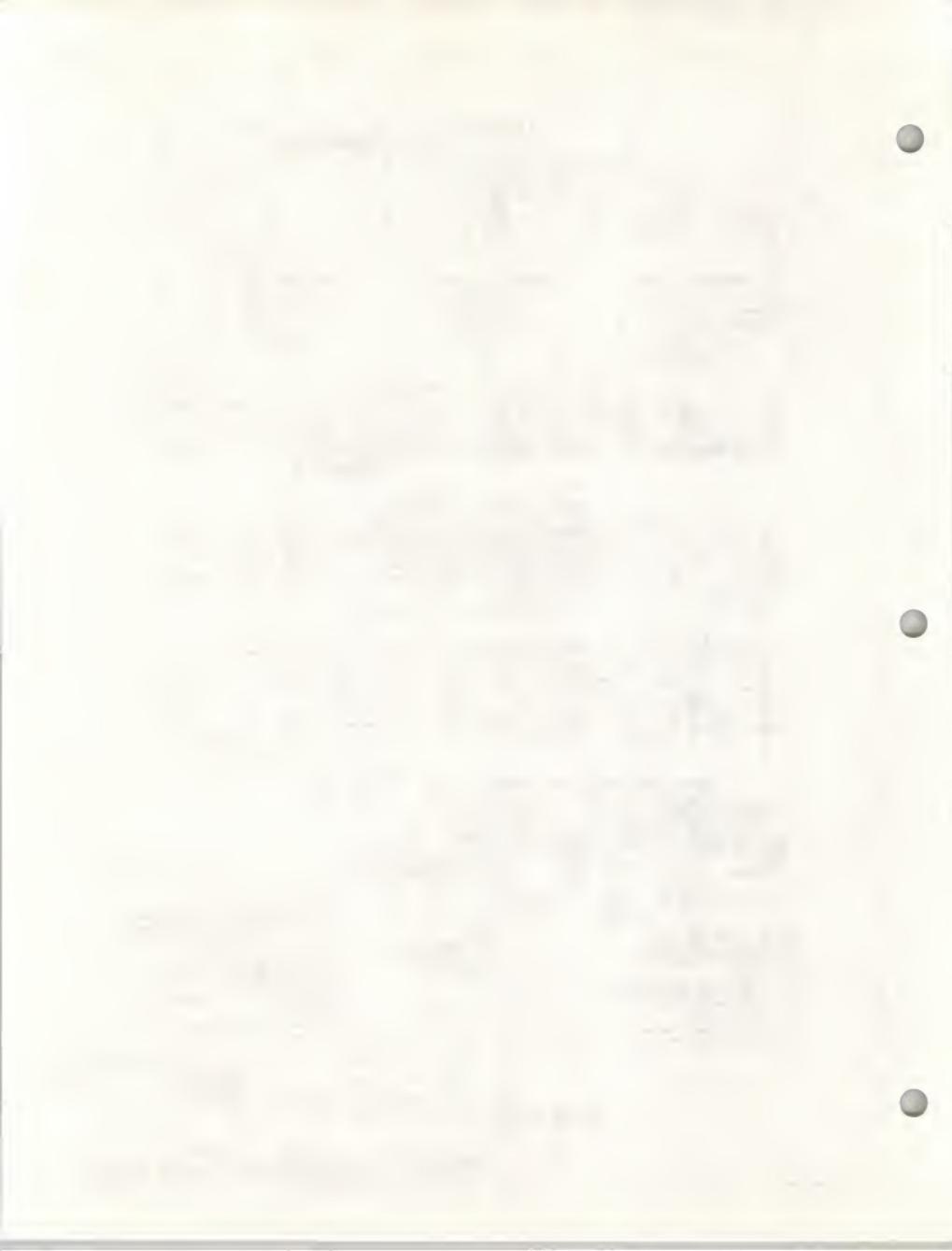
EFFECTIVE

10/20/74

4/1/79

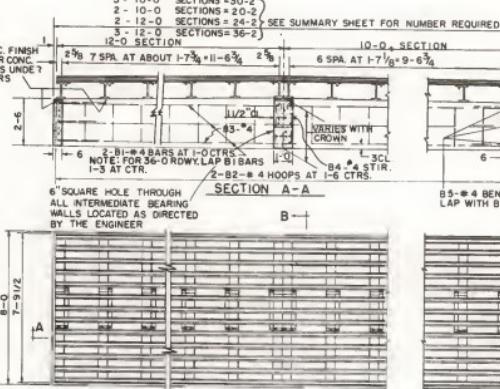
3/1/72

6/1/79



LIVE LOADING: STANDARD (H2O) LOADING

SEE CONC. FINISH
NOTE FOR CONC.
SURFACES UNDERSIDE?
STRINGERS



1-1/2" x 6 LAG SCREW-
1/4" CONNECTION PLATE WELD TO
2X1 1/2" ANGLES WITH 3/16 FILLET
WELD ALL AROUND.

(FOR 7GA, $\gamma_e = 1793^{\circ}$)



NOTE: SEE APPROVED
SHOP DWGS.
ACTUAL
LOCATION OF
ANCHOR BOLTS
AT EQUAL INTERVALS
MAX. FOOTING PRESS.=
1 TONS/SQ FT.

EST. CLASS "A" CONC. QUANTITIES

24-0 ROWY= 7 CU YDS.
36-0 ROWY= 11 CU YDS.
20-0 ROWY= 6 CU YDS.
33-0 ROWY= 10 CU YDS.

3/8" BOLT WITH CUT WASHERS
EACH SIDE OF ANGLES. WELD
SHANK TO WASHER ALL AROUND
FOR SIDE

2X2X3/BXO-3" L'S



NOTE: LOCK DETAIL SIMILAR EXCEPT
USE 5/8" x 6 GALV. MACH. BOLT
WITH GALV. CUT WASHER & GALV.
HEX. NUTS INSTEAD OF WELDED
STUD BOLT.

HINGE DETAIL

B-PLAN

THIS DIMENSION WILL VARY.
SEE APPROVED DWG. FOR
PROJECT BEFORE SETTING
FOOTING GRADES.

VARIES
ACROSS
CROSSBAR

12 SPICES AT 0-7 1/2" O.C.
SUBSTITUTE 1/2" x 6
CROSSBAR
5/8" x 6 GALV. MACH. BOLTS. HINGE
(SEE DETAIL)

TOP OF CONC.
8" WF 17/8" - 1"

BACKFILL
3' CL.

4-6 CTRs
4-6 CTRs

SEE ROAD PLANS FOR FINISHED GRADE
& CROWN OF ADJ. ROAD SECTIONS.

VARIES

2 WINGS
REINFORCED
CATTLE GUARD
INSTALLATION.
(3-16 TYP.)

STEEL WINGS

4" DIAM GALV.
METAL PIPE 12
IN. O.D. 1/2 IN.
PLACED AS
DIRECTED BY
THE ENGINEER

5/8" BOLT
WITH CUT
WASHERS
AT 1-6 O.C.

MULTIPLE
INSTALLATION JOINT

SECTION B-B

30(2+8)=107" INSIDE
40(1+B TO #11) RADIUS
40 DR 2 1/2 MIN.

21/2D=INSIDE RADIUS
(2+20+9 BARS)

45° X 6 DIA. OF BAR

60

NOTE: LOCK DETAIL SIMILAR EXCEPT
USE 5/8" x 6 GALV. MACH. BOLT
WITH GALV. CUT WASHER & GALV.
HEX. NUTS INSTEAD OF WELDED
STUD BOLT.

TYPE 1-1-0 1/2

TYPE 2-0-9

TYPE 3-7-7

20' ROWY

30' ROWY

38' ROWY

40' ROWY

42' ROWY

44' ROWY

46' ROWY

48' ROWY

50' ROWY

52' ROWY

54' ROWY

56' ROWY

58' ROWY

60' ROWY

62' ROWY

64' ROWY

66' ROWY

68' ROWY

70' ROWY

72' ROWY

74' ROWY

76' ROWY

78' ROWY

80' ROWY

82' ROWY

84' ROWY

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408' ROWY

410' ROWY

412' ROWY

414' ROWY

416' ROWY

418' ROWY

420' ROWY

422' ROWY

424' ROWY

426' ROWY

428' ROWY

430' ROWY

432' ROWY

434' ROWY

436' ROWY

438' ROWY

440' ROWY

442' ROWY

444' ROWY

446' ROWY

448' ROWY

450' ROWY

452' ROWY

454' ROWY

456' ROWY

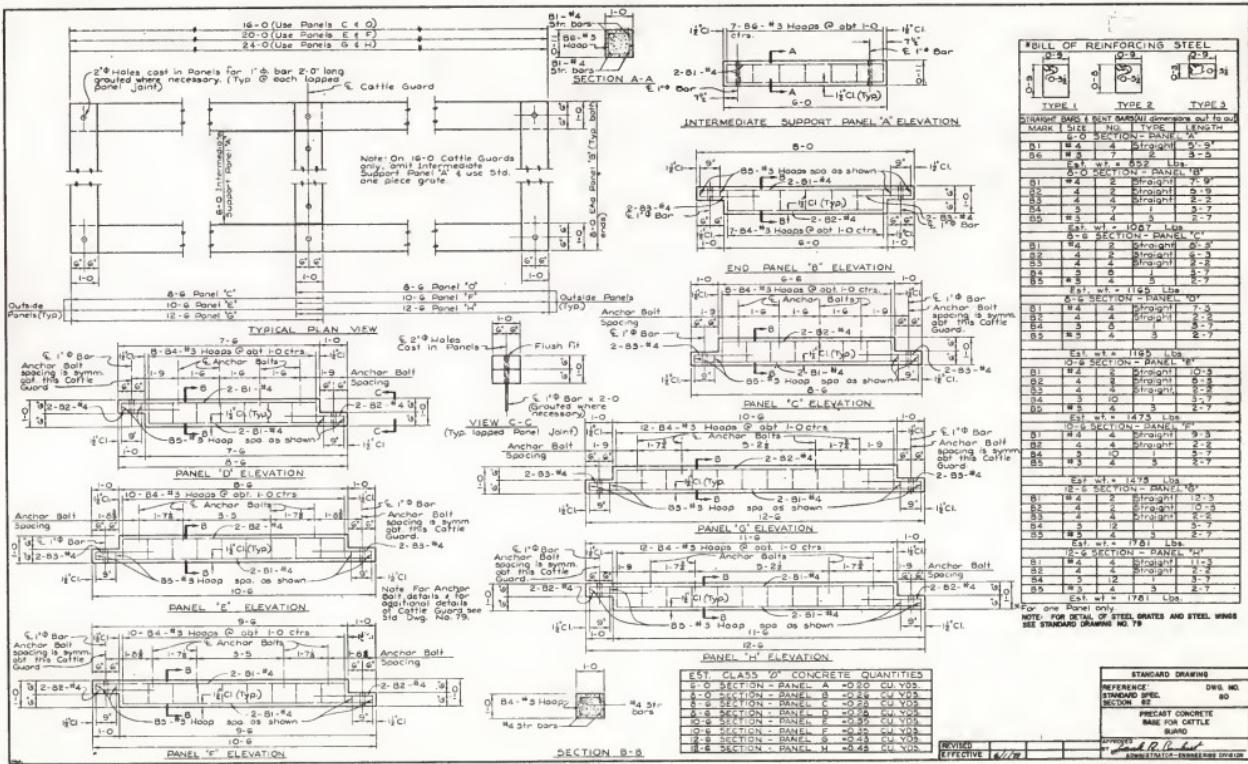
458' ROWY

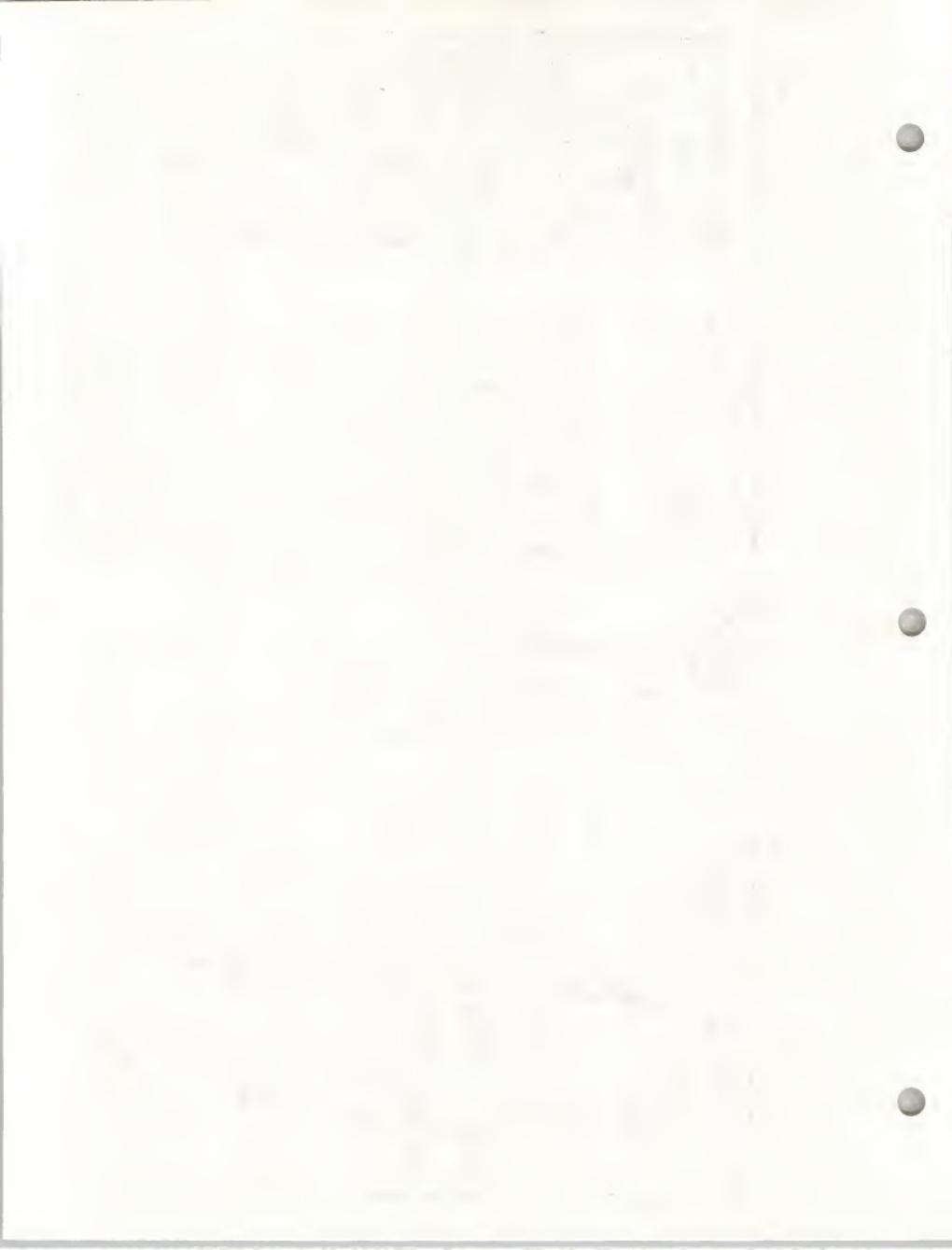
460' ROWY

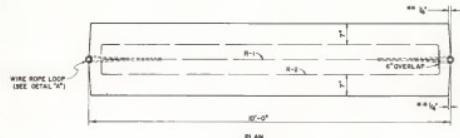
462' ROWY

464' ROWY</p



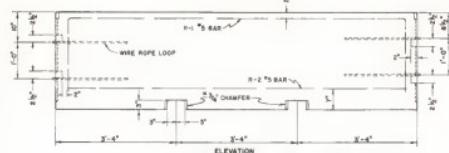




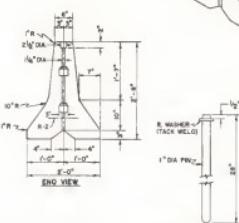


* 1/2" CHAMFER WILL BE ACCEPTABLE
** SECTION MAY BE BUILT WITHOUT 1/2" RIVET

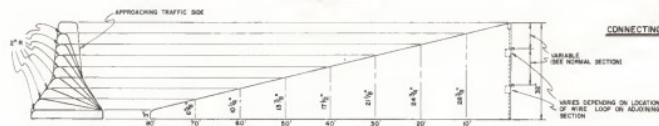
PLAN



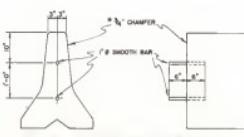
NORMAL SECTION



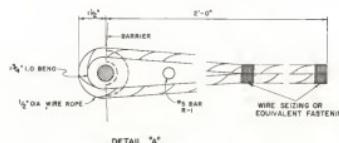
CONNECTING PIN DETAIL



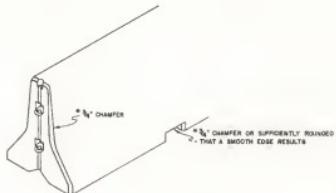
END TRANSITION DETAIL



MODIFIED END FOR BRIDGE CONNECTION



DETAIL "A"



NOTES

CONCRETE SHALL BE CLASS "D" OR EQUAL.

THE FINISHED SURFACE OF THE BARRIER SHALL BE SMOOTH, DENSE, UNPITTED AND FREE FROM AIR BUBBLE POCKETS, DEPRESSIONS AND HONEY COMB IF THE ENGINEER DECEIVES THE CONTRACTOR TO USE PRECAST CONCRETE, THE CONTRACTOR SHALL USE A WOOD FLOAT FINISH IN ORDER TO OBTAIN THE ABOVE MENTIONED FINISH SURFACE. REINFORCING STEEL SHALL BE MADE OF DEFORMED BARS AND SHALL CONFORM TO A.T.T. C-100-60. THE CONTRACTOR SHALL ENSURE THAT THE REINFORCING STEEL IS TIED TO THE CONCRETE. EACH 10' SECTION SHALL BE CONNECTED WITH A 1" DIA X 28" PIN.

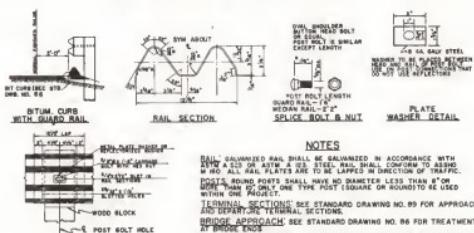
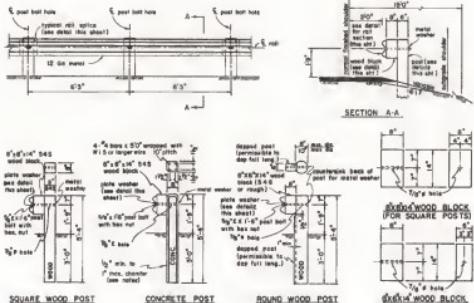
THE END TRANSITION SHALL BE A CAST IN PLACE SECTION WITH TRANVERSE JOINTS PROVIDED IN THE CENTER. THE OPEN Joints EDGES WITH A 1/2" RADIUS TONGUE SHALL BE USED. THE CONTRACTOR MAY CHOOSE TO USE PRECAST CONCRETE FOR THE END TRANSITION. THE CONTRACTOR SHALL MAKE PROVISIONS FOR CONNECTING THE SECTIONS TOGETHER AND FOR LIFTING THIS SECTION DURING THE CONSTRUCTION OF THE PROJECT.

ALL EXPOSED METAL PARTS TO BE COATED WITH ONE COAT OF PRIMER AND TWO COATS OF ALUMINUM PAINT. METAL PARTS ARE CONSIDERED TO INCLUDE THE WIRE ROPE, BARS, CONNECTING PINS, ETC. ARE NOT CONSIDERED PARTS ARE THE CONCRETE, CONCRETE MEDIAN BARRIER RAIL, PRECAST CONCRETE SECTIONS, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRECAST CONCRETE MEDIAN BARRIER RAIL. SUFFICIENT PRECAST SECTIONS SHALL BE ASSEMBLED AND POSITIONED ON THE GROUND SO THAT PROPER ALIGNMENT CAN BE MAINTAINED ON ALL ROADWAY ALIGNMENT, CURVES AS WELL AS IN TRANSITION. THE SPAN SHALL BE DETERMINED EARLY IN FABRICATION.

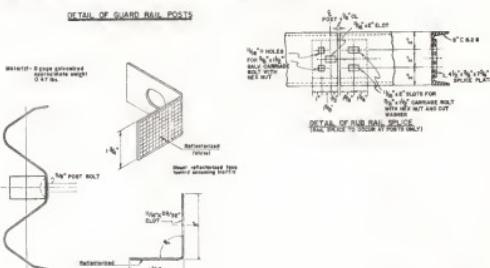
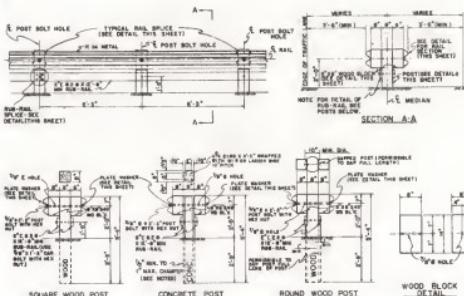
STANDARD DRAWING		Dwg. No.
REFERENCE	SECTION	84
CONCRETE MEDIAN RAIL		
REVISED 9/10/74 EFFECTIVE 9/1/76 BY <i>R. B. Burch</i> ADMINISTRATOR - ENGINEERING DIVISION		



METAL GUARD RAIL

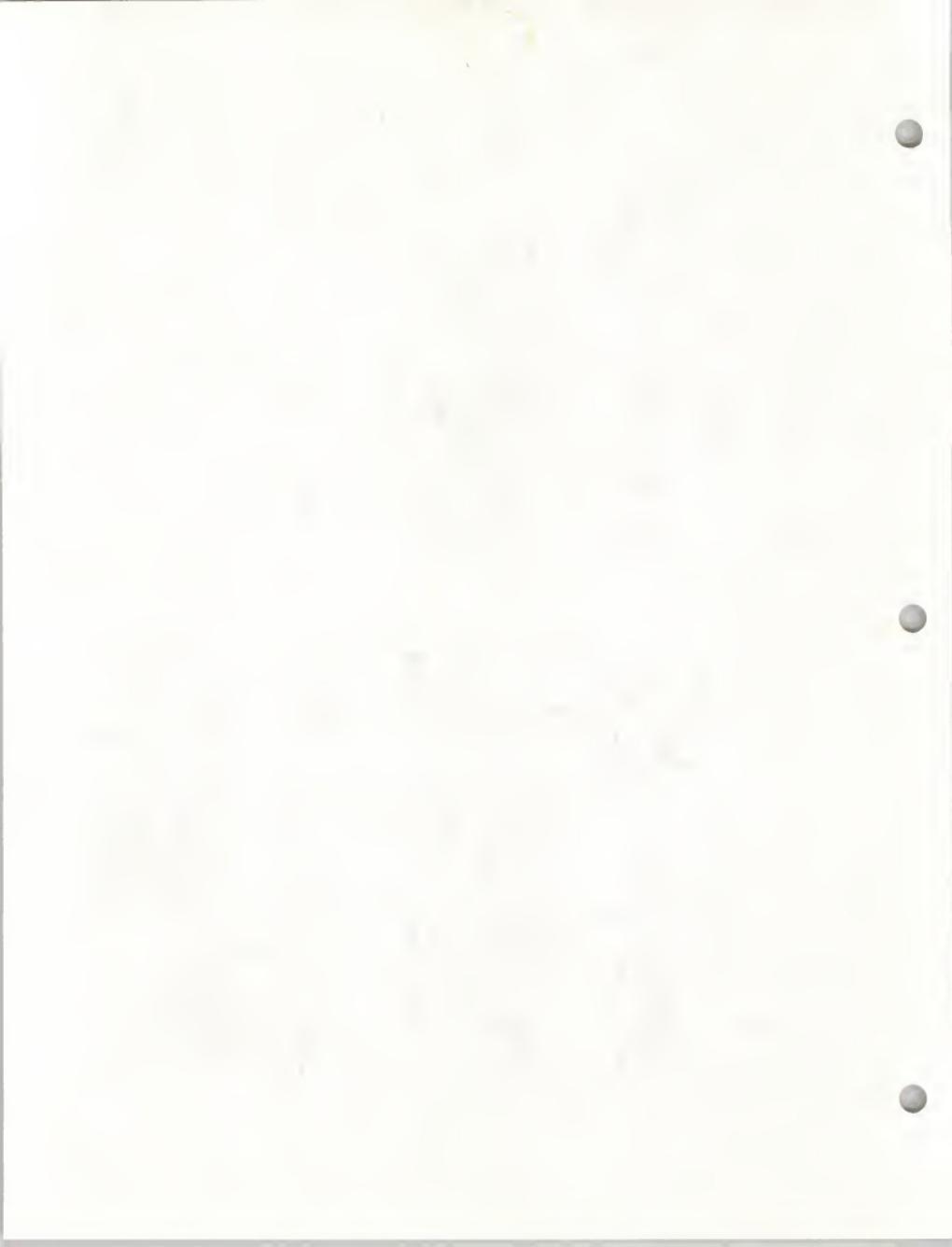


METAL MEDIAN RAIL



REFLECTOR - WASHER

REVISED	1/1/72	1/1/72
EFFECTIVE	8/1/72	8/1/72
APPROVED	John P. Gandy	
ADMINISTRATIVE DRAWING	Engineering Division	



BRIDGE APPROACH SECTIONS
WITH WOOD POSTS

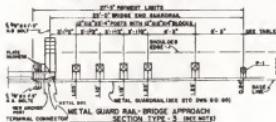
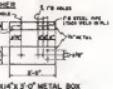
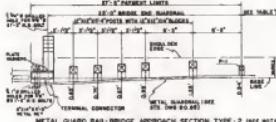
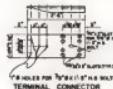
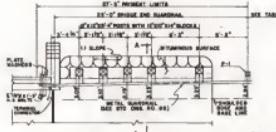


TABLE A

	ST-1	TYPE-1	TYPE-2	TYPE-3
2-LANE TREATMENT	CONTINUOUS WATER RAIL	WATER RAIL BARS	ST-1 SPAN RAIL	ST-1 SPAN RAIL
	NON-CONTINUOUS SILVER-RAIL	NON-CONTINUOUS SILVER-RAIL	NON-CONTINUOUS SILVER-RAIL	NON-CONTINUOUS SILVER-RAIL



METAL GUARD RAIL BRIDGE APPROACH SECTION

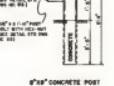
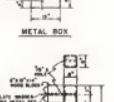
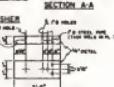
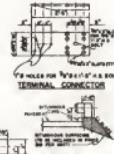
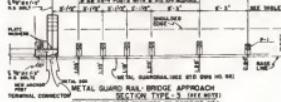
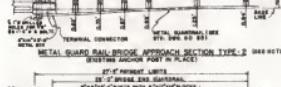
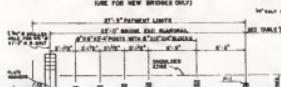
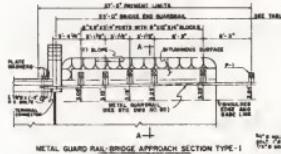
MEASUREMENT: ONE INSTALLATION COMPLETE AS DETAILED TO BE

INCLUDED IN THE QUOTATION.

NOTE: THIS STD. IS TO BE USED FOR BRIDGE APPROACH AND/OR
DEPARTURE ENDS FOR TWO-WAY TRAFFIC AND FOR APPROACH SPANS
WHERE THERE IS NO EXISTING DEPARTMENT OF HIGHWAY
POST CAN BE USED FOR ONE-WAY DEPARTURE ENDS.

FOR BRIDGE APPROACH SECTIONS TYPE-1 AND TYPE-2
AND FROM PLANS FOR VEHICLES IN MILEAGE.

BRIDGE APPROACH SECTIONS
WITH CONCRETE POSTS



STANDARD DRAWINGS

REFERENCE: DRAW. NO.
SPEC. SECTION NO.

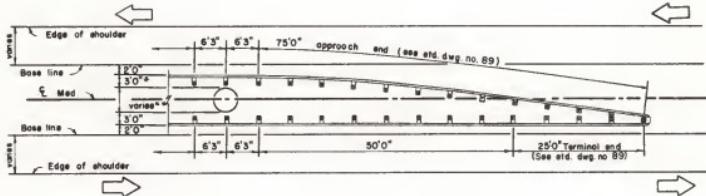
REVISION: 4/1/78

EFFECTIVE: 3/1/78 4/1/78

BRIDGE END TREATMENT

AMERICAN BRIDGE COMPANY, INC.

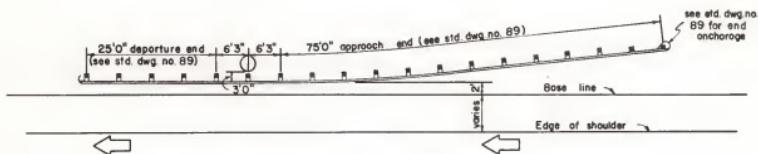




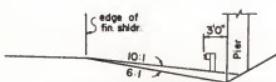
MEDIAN BRIDGE PIER TREATMENT

* This dimension may be greater if pier footings interfere with the guardrail post or if continuous rail is provided on the shoulder.

** When pier width is greater than 3'0", adjust the last eight post offsets of the 75' terminal section to fit the condition.



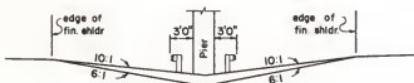
OUTSIDE SHLDR. BRIDGE PIER TREATMENT



NOTE: Obstruction less than 30' from edge of nearest traffic lane require guardrail.

NOTE: When guardrail installations are more than 2 feet from the edge of the shoulder, the fill slope shall be a 10:1 slope beginning at the edge of finished shoulder.

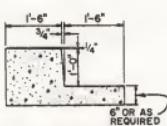
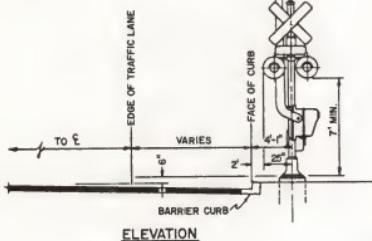
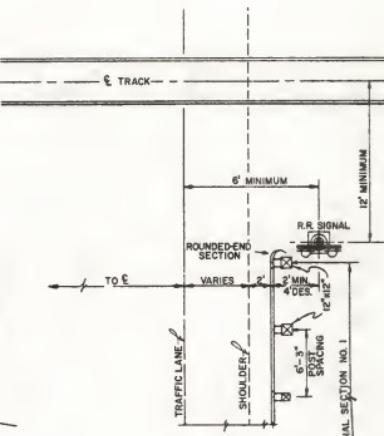
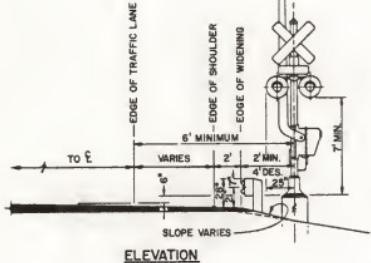
OUTSIDE SHOULDER SLOPE



MEDIAN SLOPE

STANDARD DRAWING		
REFERENCE	DWG. NO.	87
STANDARD SPEC.		
SECTION 90		
PIER TREATMENT		
REVISED	4/1/79	
EFFECTIVE	3/1/72	6/1/79
APPROVED BY <i>Frank D. Bandy</i>		
ADMINISTRATOR - ENGINEERING DIVISION		



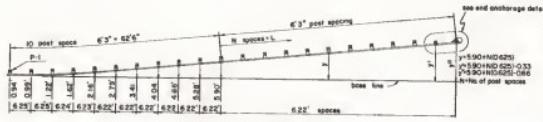


SEE BULL. ETIN NO. 7, "RECOMMENDED PRACTICES FOR RAILROAD-HIGHWAY GRADE CROSSING PROTECTION" OF AMERICAN RAILROADS, FOR ADDITIONAL DETAILS & SKewed CROSSINGS.

SEE STD. DWG. NO. 89 FOR TERMINAL SECTION DETAILS.

STANDARD DRAWING			
REFERENCE:	DWG. NO. 88		
STANDARD SPEC.			
SECTION 90			
GUARDRAIL FOR GRADE CROSSING PROTECTION			
REVISED	18/20/76	4/1/79	APPROVED
EFFECTIVE	3/1/72	8/1/75	By <i>Donald D. Pendleton</i>
ADMINISTRATOR - ENGINEERING DIVISION			





TERMINAL SECTION 3



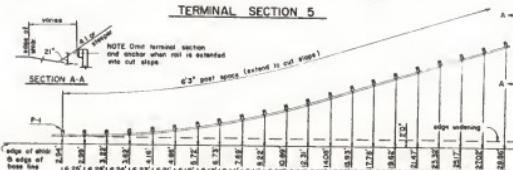
TERMINAL SECTION 4

TABLE "B"										
BRIDGE WIDTH (FT)	28'		30'		32'		34'		36'	
ROADWAY WIDTH (FT)	24	26	28	30	32	34	36	38	40	42
TERMINAL 3 (inches)	6	10	14	16	20	22	26	30	34	38
TERMINAL 4 (inches)	0	2	4	6	10	12	16	20	26	30

so that P-1 will match the continuous and

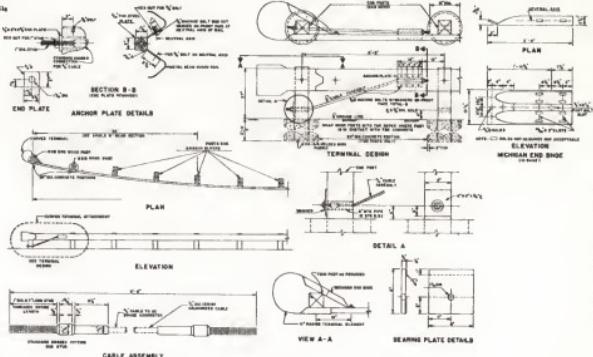


TERMINAL SECTION 5



TERMINAL SECTION 6

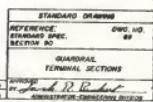
{ This Terminal Section to be used for out sizes embossed



TERMINAL SECTION I



TERMINAL SECTION 2
TO BE USED ON FOUR-LANE DIVIDES DEPARTURE ENDS





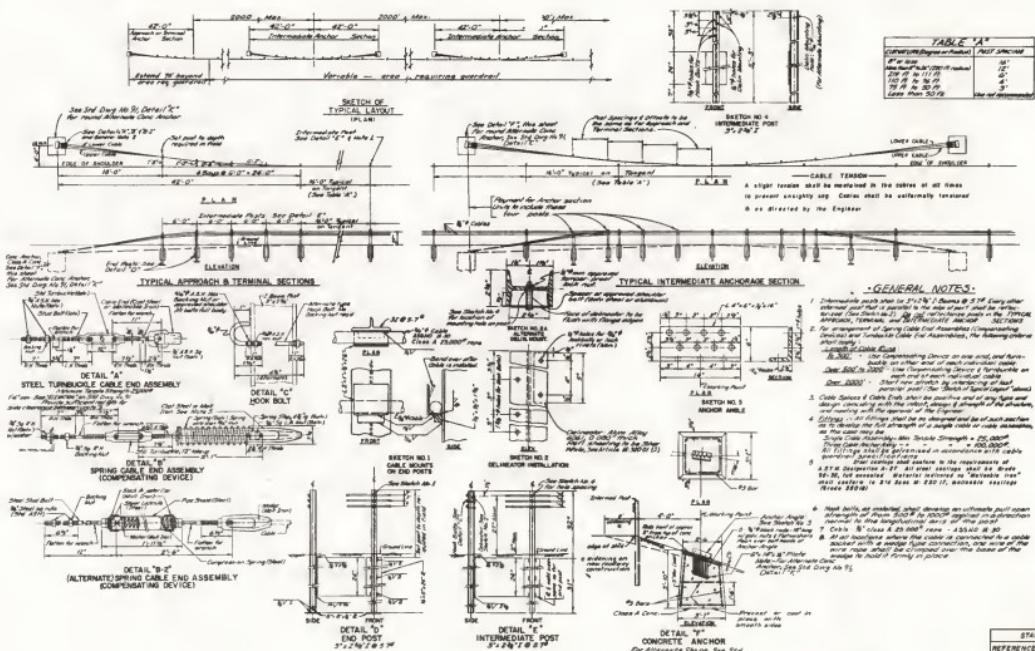
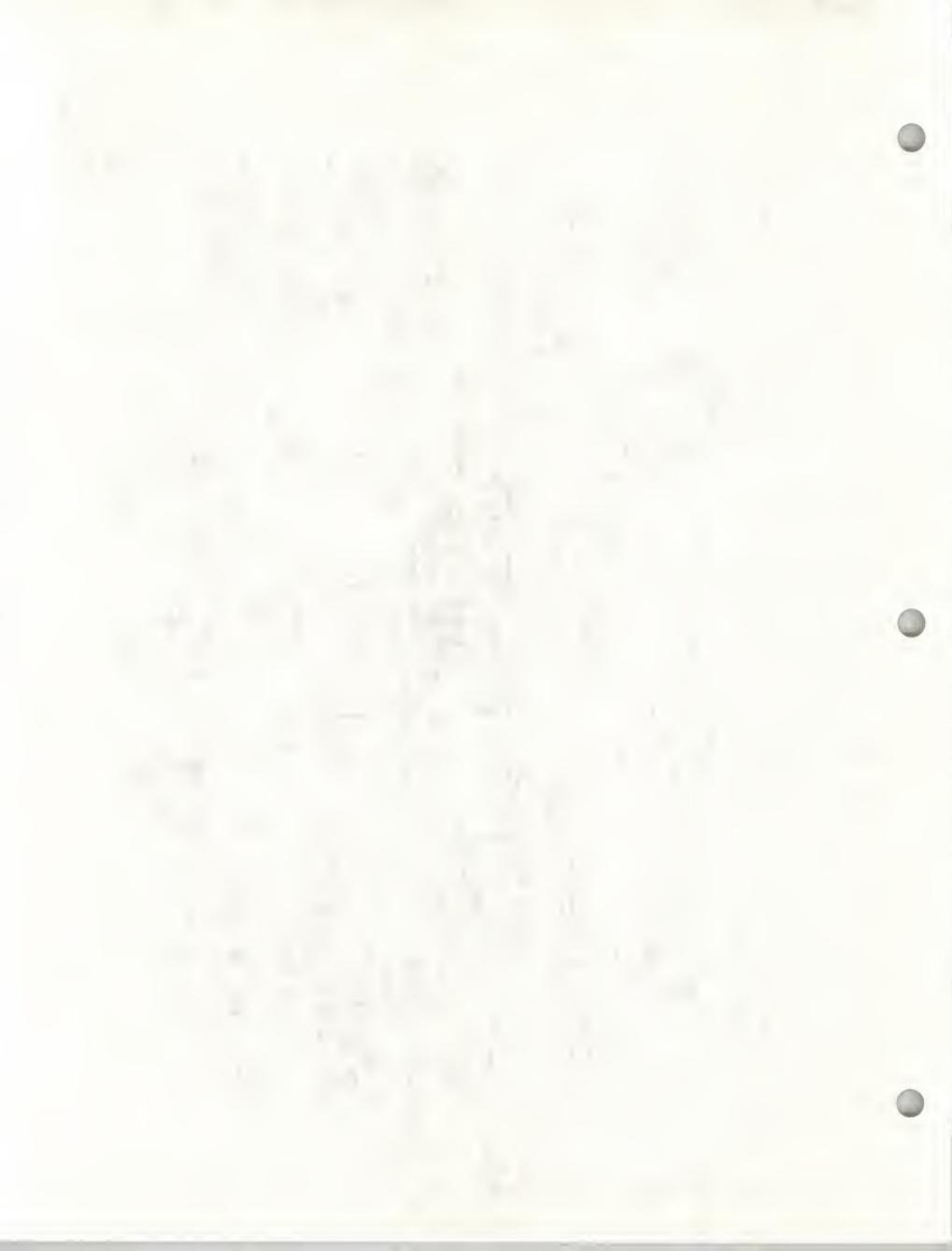
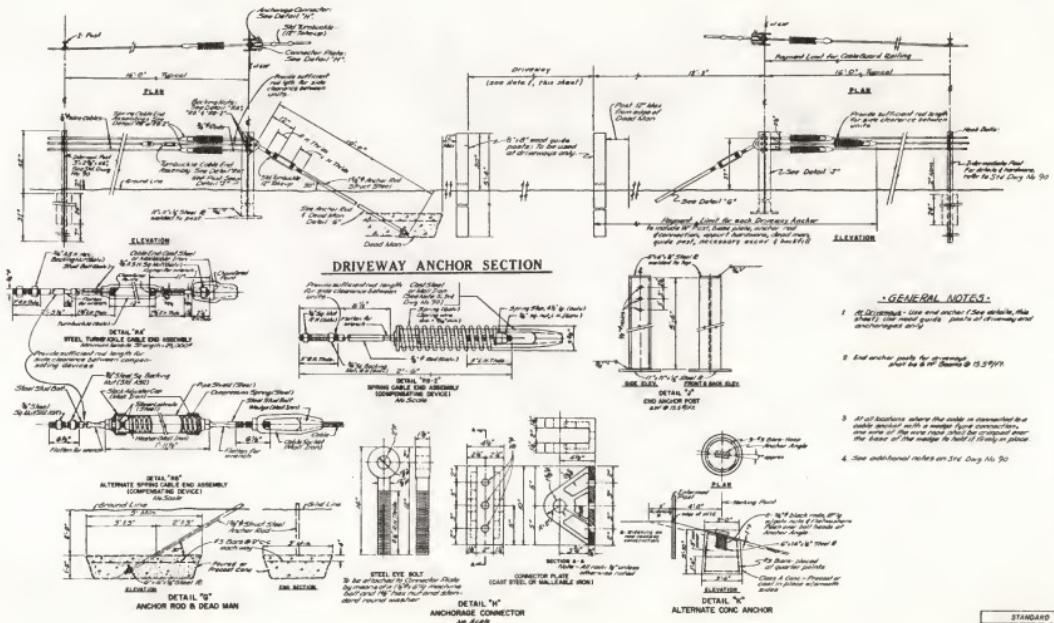


TABLE 1A *	
CURRENT (Degree of Freedom)	POST SIMPLY
0° or less	10%
10° to 20°	15%
20° to 30°	20%
30° to 50°	45%
Less than 50°	See Note

STANDARD DRAWING	
REFERENCE	DW NO
EXHIBIT SPEC.	NO
ECTION NO	
CABLE GUARDRAIL	
REVISED	3/1/72
EFFECTIVE	
APPROVED	R. P. Robert
ADMINISTRATIVE ENGINEER SIGNATURE	





GENERAL NOTES.

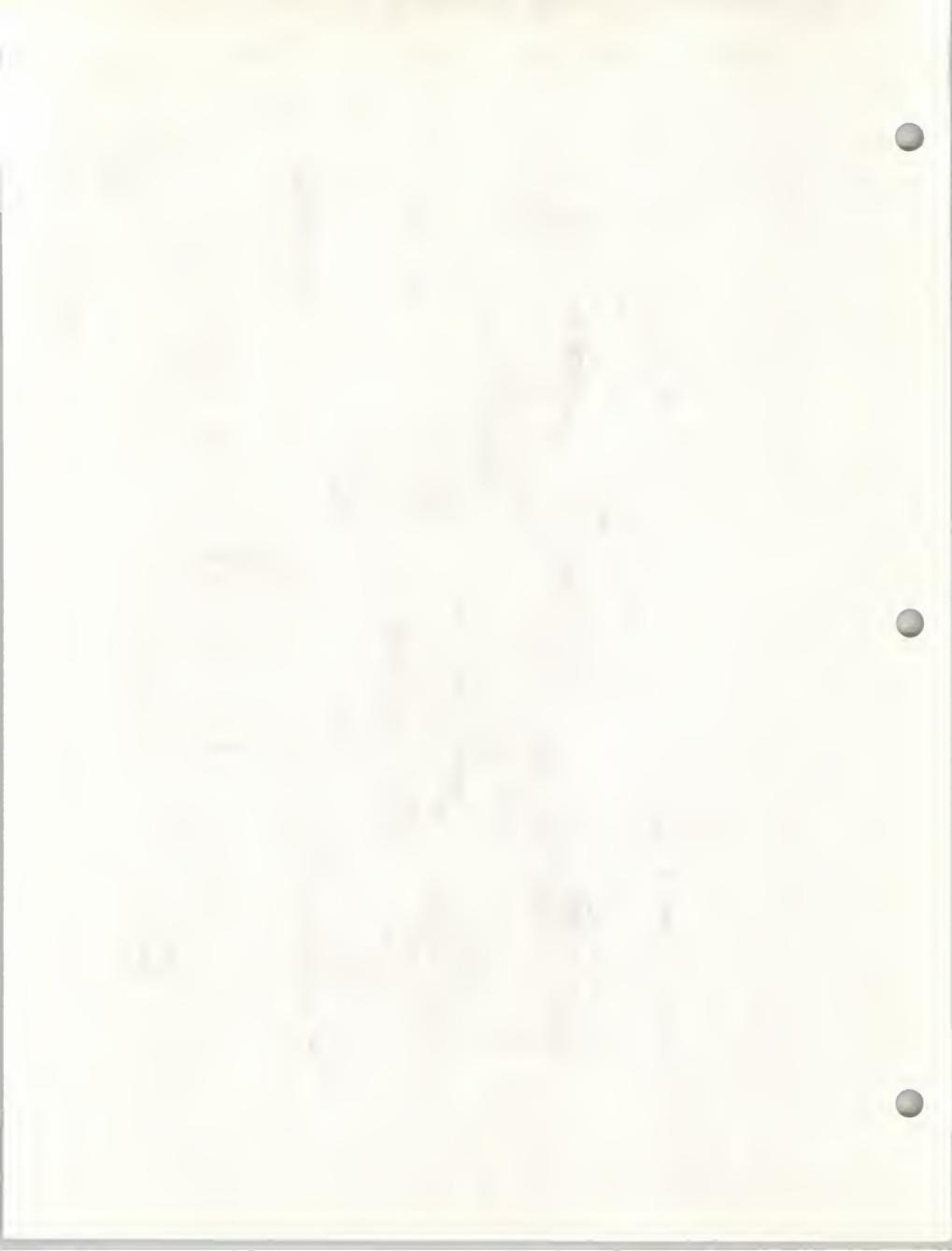
1. At **transoms** - Use one anchor (See details, this sheet) clear mud glands, patches of churning and anchorage areas.
 2. End anchor party for streaming
phot by G.W. Geary @ 1539W
 3. At all locations where the cable is connected to a cable spool or to the top of a connector, make one end of the wire rope shall be coiled over the base of the handle to hold it firmly in place.
 4. One additional anchor on each end of the cable.

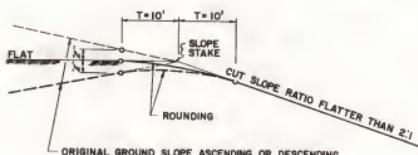
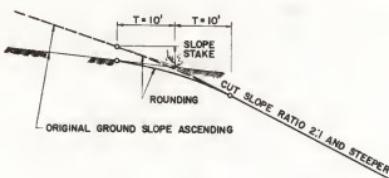
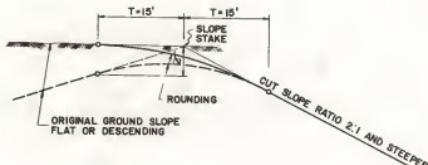
中華人民共和國·廣東·廣州

REFERENCE DWG NO.
STANDARD SPEC. BY

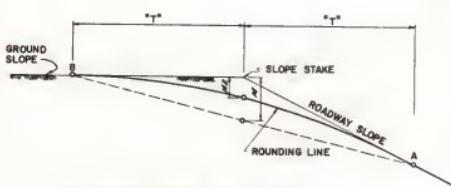
**CABLE GUARDRAIL
DRIVeway ANCHOR SECTION**

REVISED
EFFECTIVE 3/1/22





VERTICAL OFFSETS FROM ROADWAY AND GROUND SLOPES
TO ROUNDING LINES FOR CUTS



NOTE: VERTICAL OFFSETS "M₂" SHALL BE M₂

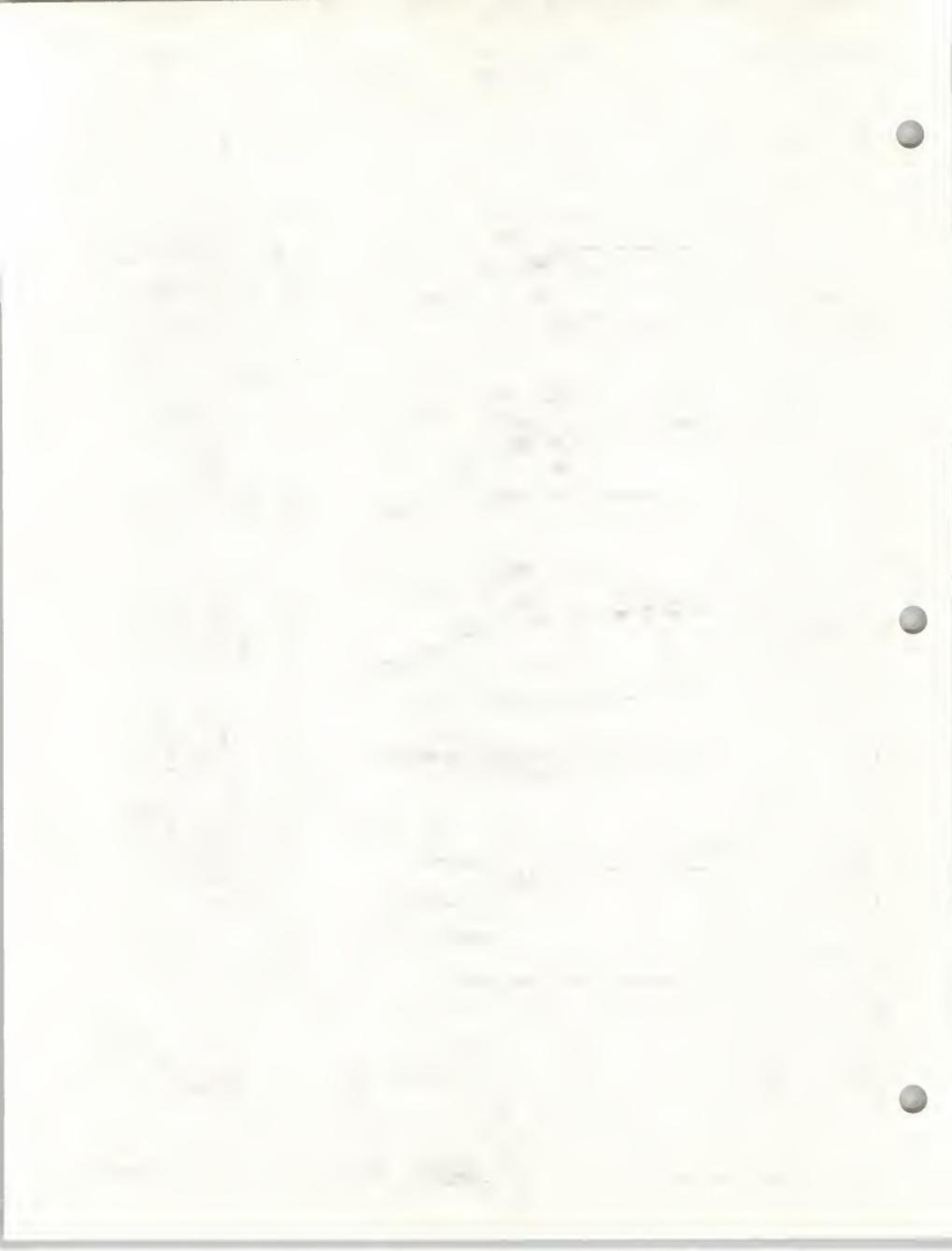
M 2-C SLOPES 2:1 & STEEPER (T = 15')					
VERT.	DESCENDING GROUND-CUTS	M 2 = M ₂ (FT.)			
"E"					
(FT.)	3/4, 1, 1; 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10, 1/11, 1/12, 1/13, 1/14, 1/15, 1/16				
FLAT	5.0	5.0	3.0	2.5	2.2
2.0	1.5	1.5	3.5	3.5	2.4
4.0	6.0	6.0	3.5	3.5	2.4
6.0	6.5	6.5	4.5	4.0	3.4
8.0	7.0	5.8	5.0	4.5	3.4
10.0	7.5	6.3	5.5	5.0	4.4
12.0	8.0	6.8	6.0	5.5	4.4
14.0	8.5	7.3	6.5	6.0	5.4
16.0	9.0	7.8	7.0	6.5	5.9

M 2-C SLOPES 2:1 & STEEPER (T = 10')					
VERT.	ASCENDING GROUND-CUTS	M 2 = M ₂ (FT.)			
"E"					
(FT.)	3/4, 1, 1; 1/2, 1/3, 1/4, 1/5, 1/6				
FLAT	3.4	2.5	2.0	1.7	1.4
2.0	1.0	1.0	0.9	0.9	0.8
4.0	2.4	1.5	1.0	0.7	0.6
6.0	1.0	1.0	0.5	0.2	0.0
8.0	1.4	0.5	0.0	0.0	0.0
10.0	0.9	0.0			
12.0	0.4				
14.0	0.0				

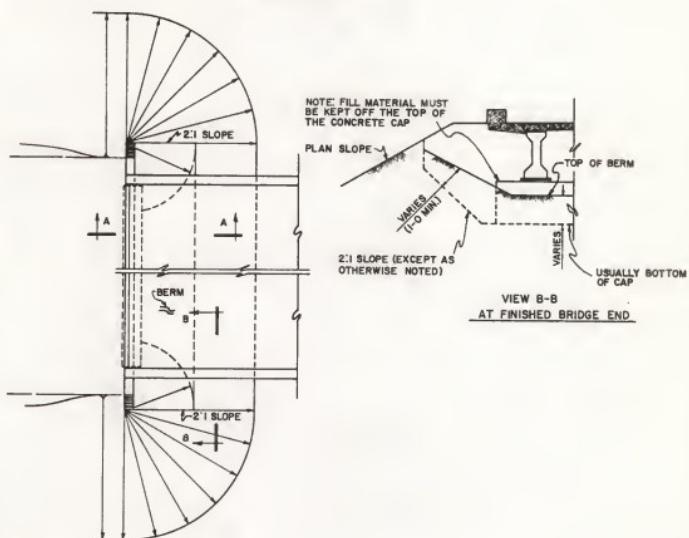
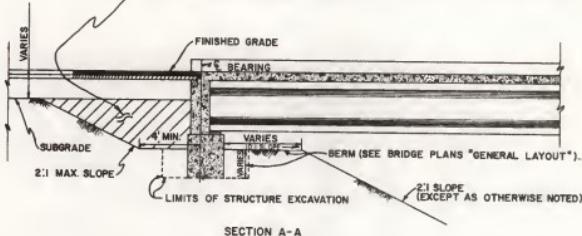
M 2 FOR CUT SLOPES FLATTER THAN 2:1 (T = 10')					
VERT.	DESCENDING GROUND-CUTS	M 2 = M ₂ (FT.)			
"E"					
(FT.)	2 1/2, 3 1/3, 3 1/4, 4 1/5, 5 1/6, 6 1/7				
FLAT	1.0	0.8	0.7	0.6	0.5
1.0	1.3	1.1	1.0	0.9	0.8
2.0	1.5	1.3	1.1	1.0	0.9
3.0	1.8	1.6	1.4	1.3	1.2
4.0	2.0	1.8	1.7	1.6	1.4
5.0	2.3	2.0	1.9	1.8	1.7
6.0	2.5	2.3	2.2	2.1	2.0
7.0	2.8	2.6	2.5	2.4	2.3
8.0	3.0	2.8	2.7	2.6	2.5
9.0	3.3	3.1	3.0	2.9	2.8
10.0	3.5	3.3	3.2	3.1	3.0

M 2 FOR CUT SLOPES FLATTER THAN 2:1 (T = 10')					
VERT.	ASCENDING GROUND-CUTS	M 2 = M ₂ (FT.)			
"E"					
(FT.)	2 1/2, 3 1/3, 3 1/4, 4 1/5, 5 1/6, 6 1/7				
FLAT	1.0	0.8	0.7	0.6	0.5
1.0	0.8	0.6	0.5	0.4	0.3
2.0	0.5	0.3	0.2	0.1	0.0
3.0	0.3	0.0	0.0	0.0	0.0
4.0	0.0				
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					

STANDARD DRAWING					
REFERENCE:	DWG. NO. STANDARD SPEC. SECTION II				
SLOPE ROUNDING					
REVISED	EFFECTIVE	3/1/72	APPROVED	12/1/72	ADMINISTRATOR - ENGINEERING DIVISION



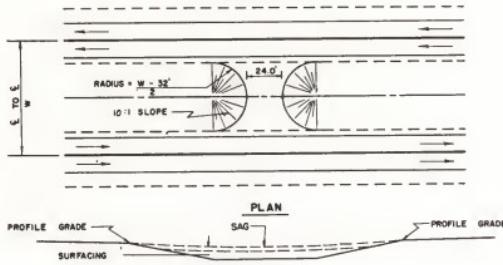
THE GRADING CONTRACTOR SHALL NOT PLACE THIS PORTION OF THE ROADWAY EMBANKMENT UNTIL AFTER THE BRIDGE CONTRACTOR HAS COMPLETED THE BACKWALL AND DECK SLAB. ALL MATERIAL SHALL BE LAYER PLACED AND COMPAKTED IN ACCORDANCE WITH ARTICLE 11.04(B) OF THE STANDARD SPECS.



STANDARD DRAWING	
REFERENCE : STANDARD SPEC. SECTION II	DWG. NO. 101
ROADWAY EMBANKMENT AT BRIDGE END	
REVISED EFFECTIVE 3/1/72	APPROVED <i>[Signature]</i> ADMINISTRATOR - ENGINEERING DIVISION

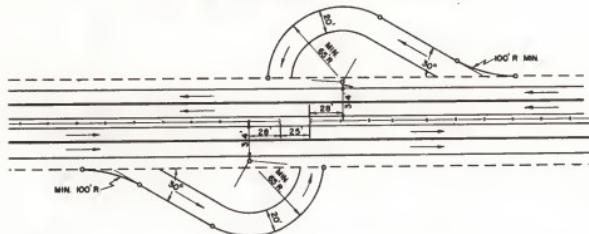


MEDIAN WIDTHS 36' TO 76'



NOTE: Turnouts above to be located and constructed in conjunction with ditch blocks if oil possible. Drainage shall be provided when necessary.

STANDARD U-TURN FOR NARROW MEDIANS



NOTES:

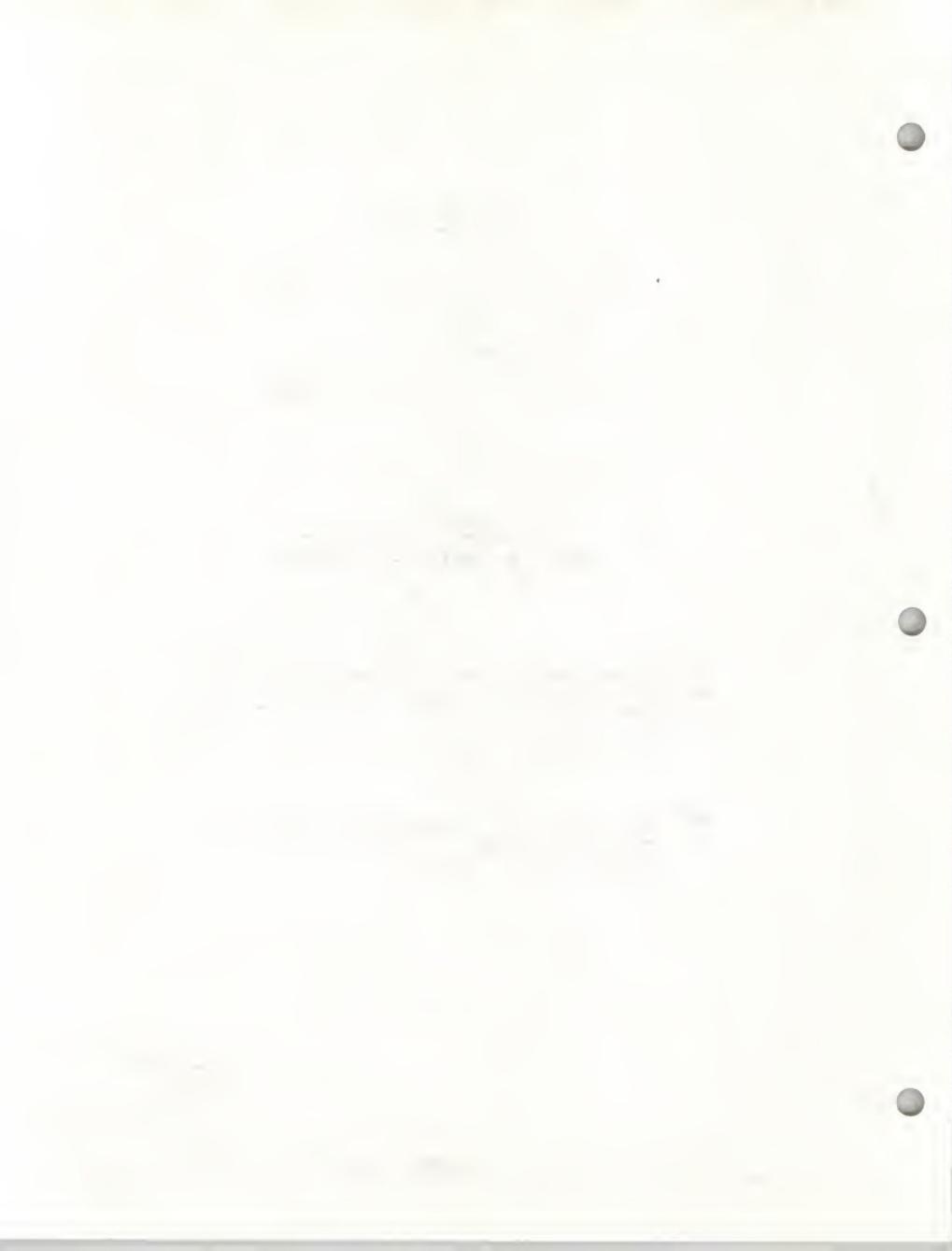
Narrow medians, median widths greater than 76 ft and independent roadways require special design.

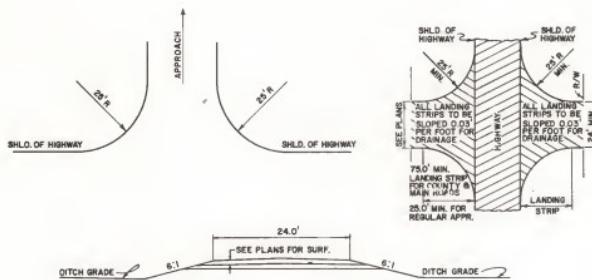
GRADES: Uniform between inside shoulders of main traveled way except for special design.

SURFACING: See plans for quantities.

DRAINAGE: Use 18" or 24" culverts if required.

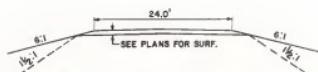
STANDARD DRAWING	
REFERENCE:	DWG. NO. 102
STANDARD SPEC.	
SECTION II	
U-TURN MEDIAN OPENINGS ON CONTROLLED ACCESS HIGHWAYS	
REVISED	EFFECTIVE
3/1/72	
APPROVED	By <i>John P. Roberts</i>
ADMINISTRATOR-ENGINEERING DIVISION	





TYPICAL SECTION AT 25' DITCH LINE

FOR DRAINAGE - PIPE AS NECESSARY



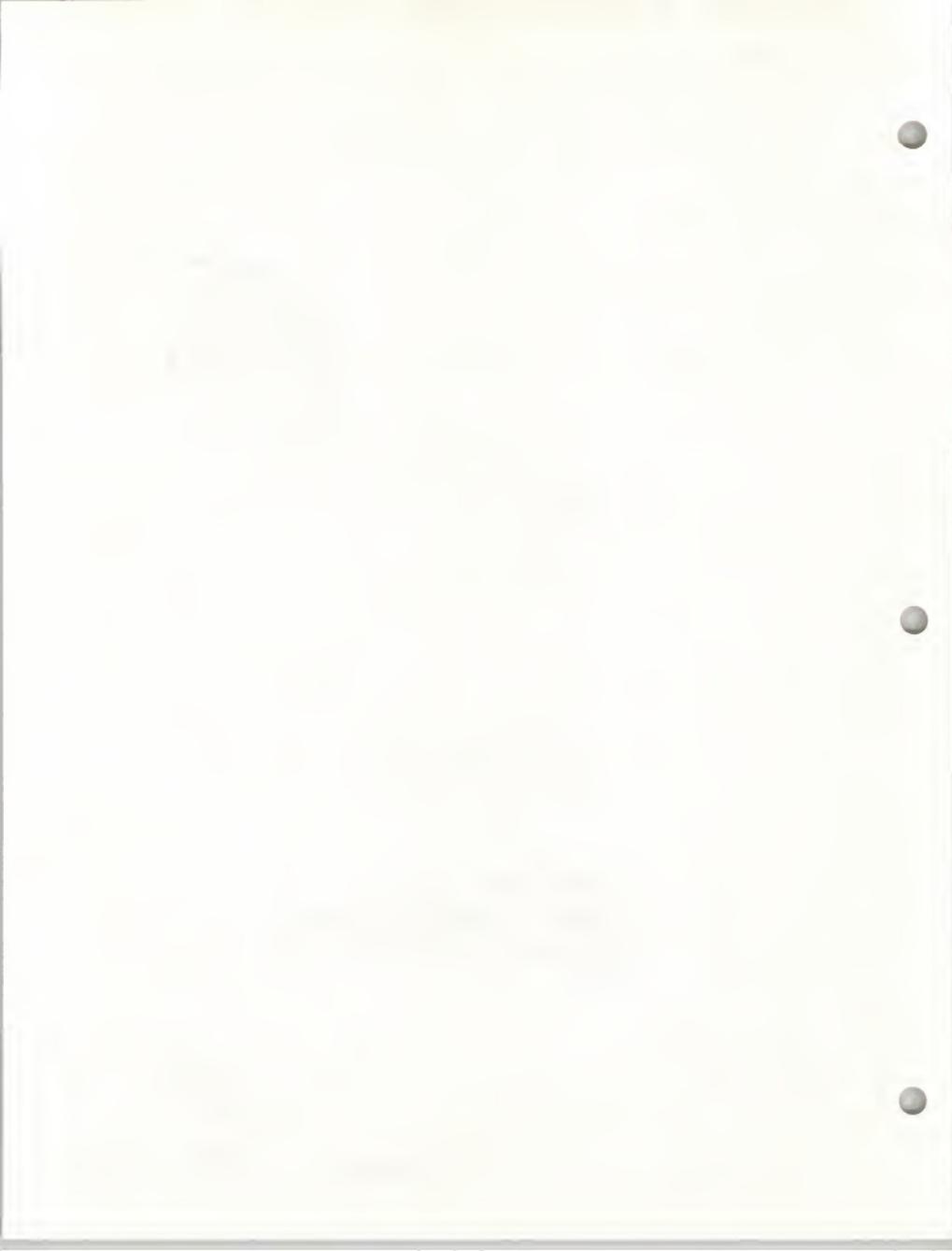
TYPICAL SECTION IN THOROUGH FILL
USE 6:1 SLOPE FOR FILLS OF 5' OR LESS

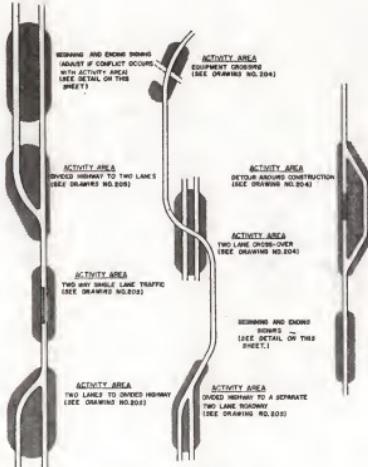
GRADE OF APPROACH NOT TO EXCEED 10% UNLESS TRAFFIC VOLUME AND COST INDICATE SUCH TO BE JUSTIFIABLE.

APPROACHES TO BE CONSTRUCTED TO FIT LOCAL CONDITIONS, BUT IN SUCH MANNER AS TO MINIMIZE TRAFFIC HAZARD AND AFFORD SAFE AND COMMODIOUS ENTRY AND EXIT OF TRAFFIC TO AND FROM MAIN ROAD.

WHERE IT BECOMES NECESSARY TO GO BEYOND RIGHT-OF-WAY LINES, WRITTEN PERMISSION SHALL BE SECURED FROM PROPERTY OWNER IN ALL INSTANCES.

STANDARD DRAWING			
REFERENCE:	DWG. NO. STANDARD SPEC. SECTION 20		
APPROACHES			
REVISED	EFFECTIVE	APPROVED	ADMINISTRATOR - ENGINEERING DIVISION
	3/1/72	J. P. [Signature]	



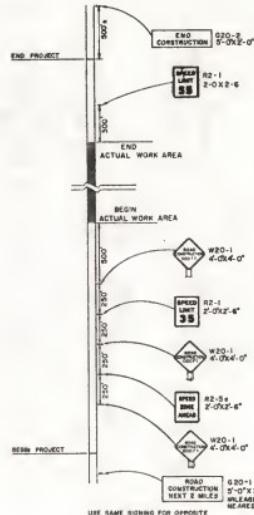


PLAN OF TYPICAL CONSTRUCTION AREAS

GENERAL NOTES

1. NO CONSTRUCTION SHALL COMMENCE OR THE PROJECT UNTIL NECESSARY CONSTRUCTION SIGNING AND MARKINGS ARE IN PLACE AND APPROVED BY THE STATE HIGHWAY ADMINISTRATION.
2. ALL SIGNS AND BARRICADES REQUIRED FOR A CONSTRUCTION PROJECT (EXCEPT AS NOTED) BE RELOCATED AND MAINTAINED BY THE CONTRACTOR.
3. THE SD-1 SIGN SHALL BE USED IF PROJECT LENGTH IS TWO MILES OR MORE, BUT MAY BE USED IF PROJECT LENGTH IS LESS THAN TWO MILES IF APPROVED BY THE STATE HIGHWAY ADMINISTRATION. THE SD-1 AND SD-2 AT OR NEAR BEGIN OR END OF CONSTRUCTION AREA SHALL NOT INTERFERE WITH THE ACTUAL CONSTRUCTION AREA.
4. ALL SIGNING AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", LATER EDITION APPROVED AND ISSUED BY THE FEDERAL HIGHWAY ADMINISTRATION.
5. ALL SITE LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO ADJUSTMENT TO FIT FIELD CONDITIONS.

6. DELIMITATOR SPACERS FOR TWO LANE AND FOUR LANE ROAD APPROXIMATING CONSTRUCTION AREAS SHALL BE ACCORDING TO SIGNING AND MARKING STANDARDS. THE SPACER LENGTH MAY BE REDUCED AS dictated BY FIELD CONDITIONS.
7. EXISTING PAVEMENT MARKINGS SHALL NOT BE ALTERED UNLESS THEY CONFLICT WITH CONSTRUCTION REQUIREMENTS OF THE CONTRACTOR AND ACTIVATION AREA.
8. THE SD-1 SIGN STANDARDS TO BE USED FOR A PARTICULAR WORK AREA SHALL BE DETERMINED BY THE ENGINEER.
9. DESIGN DETAILS OF SIGNS ARE FOUND IN THE "STANDARD HIGHWAY SIGN", 1972 EDITION PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION. THE SIZE OF THE SIGN SHALL BE INCREASED IN SIZE PROPORTIONALLY.
10. THESE CONSTRUCTION SIGNING STANDARDS ARE APPLICABLE TO CONSTRUCTION AREAS FOR TYPICAL MAJOR CONSTRUCTION OPERATIONS. THEY ARE NOT APPLICABLE TO CONSTRUCTION PERIODS FOR WHICH PROJECTS AND CONSTRUCTION AREAS ARE APPROVED AS PARTS OF A MAJOR WORK AREA. SEE PARAGRAPH 10.1.1.1 OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

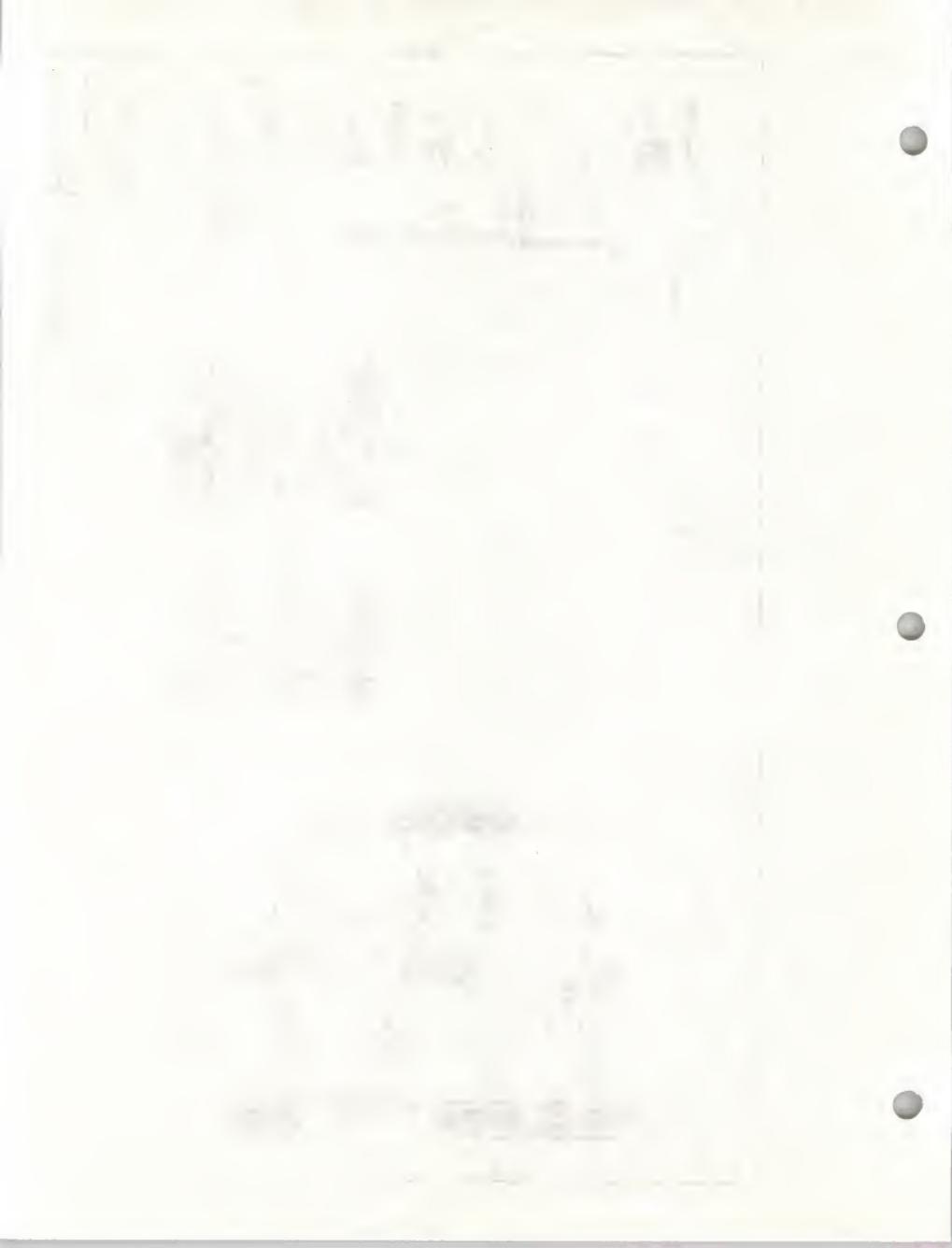


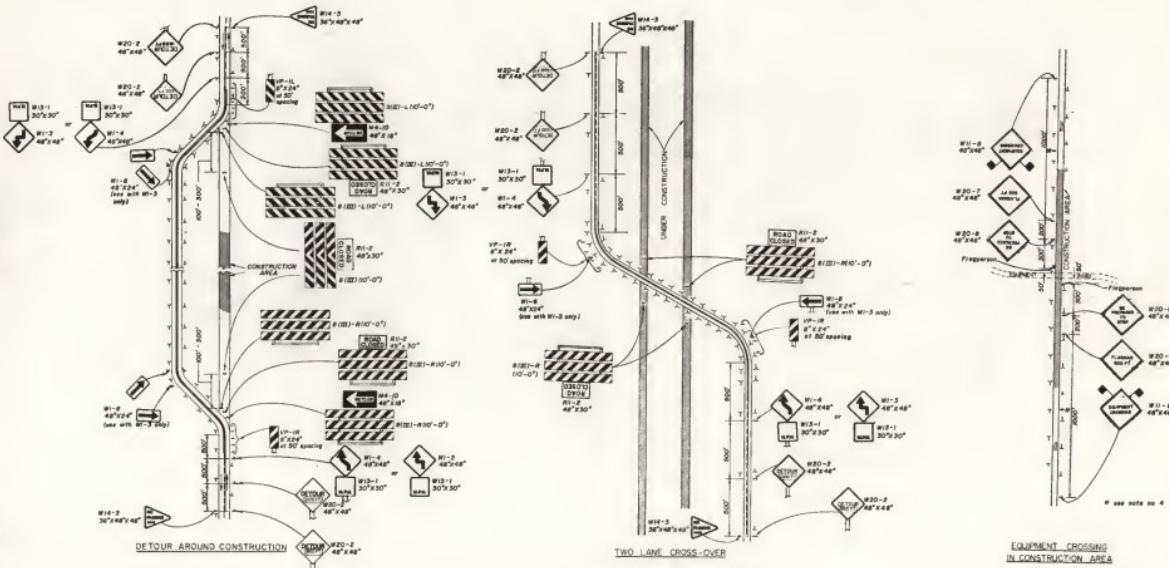
CONSTRUCTION AREA
BEGINNING AND ENDING SIGNING

STANDARD DRAWING	DWG. NO.
REFERENCE : STANDARD SPEC. SECTION NO.	203
CONSTRUCTION SIGNING STANDARDS	
REVISED	4/1/77
EFFECTIVE	4/1/77

REVISION : 4/1/77 4/1/77
EFFECTIVE : 4/1/77 4/1/77

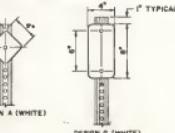
ZPRL





NOTES:

1. W1-1 right side to end only when design speed of 40 MPH is 30 MPH or less.
2. Paved shoulders 3' wide or greater shall have a 1' shoulder drop-off.
3. Where construction area is unopened additional detouring may be added.
4. A 20' (6000 mm) shoulder width is required to areas with heavy traffic volumes.

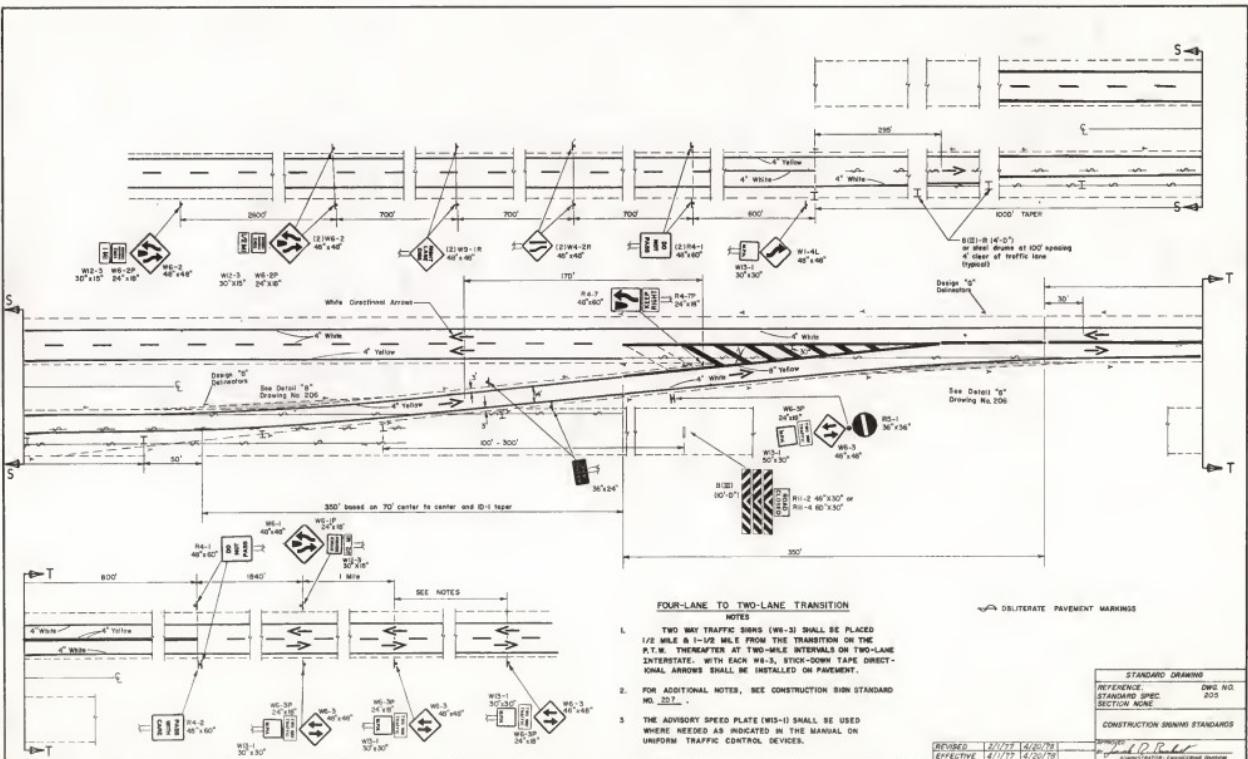


STANDARD DRAWINGS

REFERENCE: STANDARD SPEC.
SECTION NO. 204
Dwg. No. 204

CONSTRUCTION SIGNING STANDARDS





FOUR-LANE TO TWO-LANE TRANSITION

NOTES

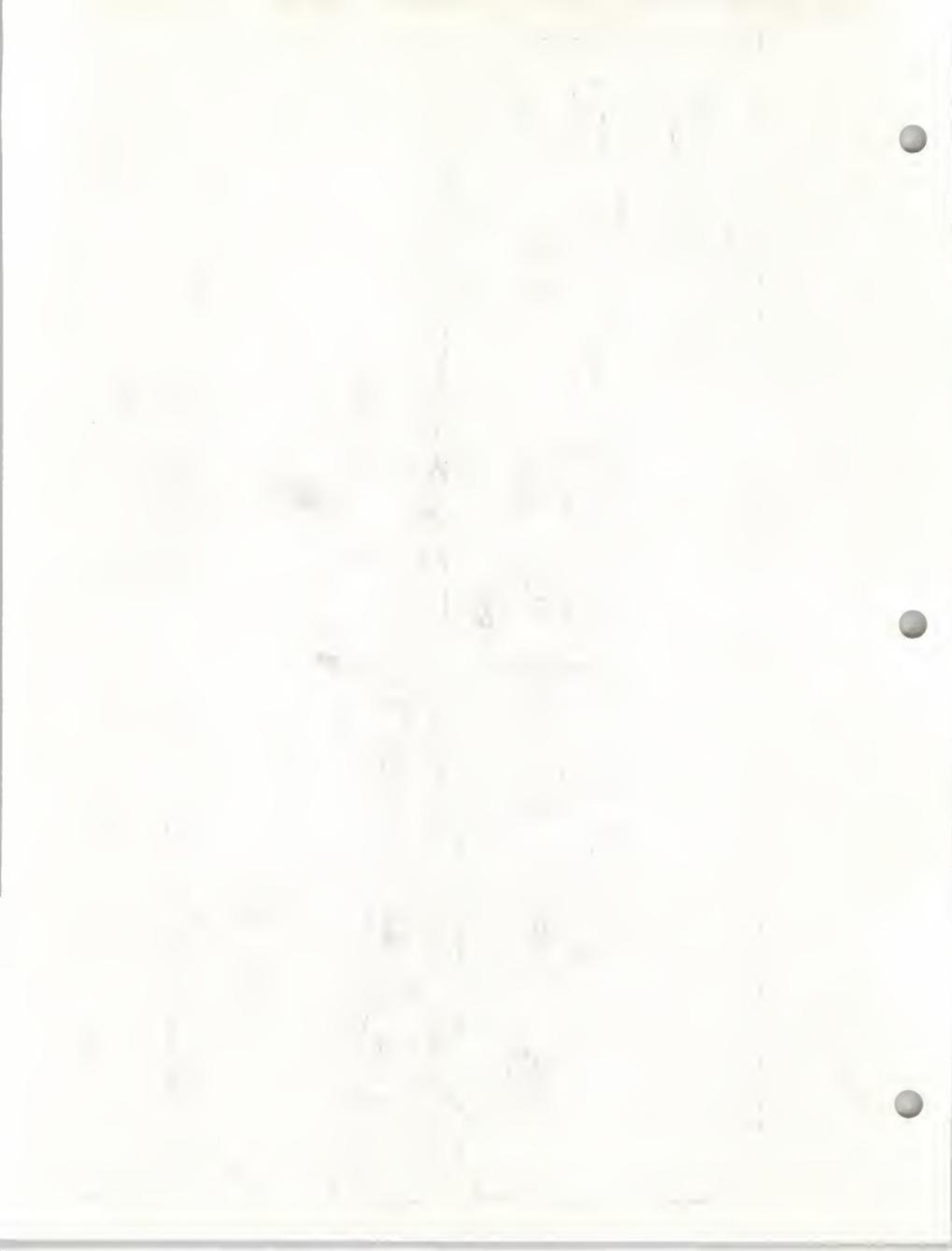
1. TWO WAY TRAFFIC SIGNS (W1-3) SHALL BE PLACED 1/2 MILE & 1-1/2 MILE FROM THE TRANSITION ON THE P.T.W. THEREAFTER AT TWO-MILE INTERVALS ON TWO-LANE INTERSTATE. WITH EACH W1-3, STICK-DOWN TAPE DIRECTIONAL ARROWS SHALL BE INSTALLED ON PAVEMENT.
2. FOR ADDITIONAL NOTES, SEE CONSTRUCTION SIGN STANDARD NO. 207.
3. THE ADVISORY SPEED PLATE (W1-1) SHALL BE USED WHERE NEEDED AS INDICATED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

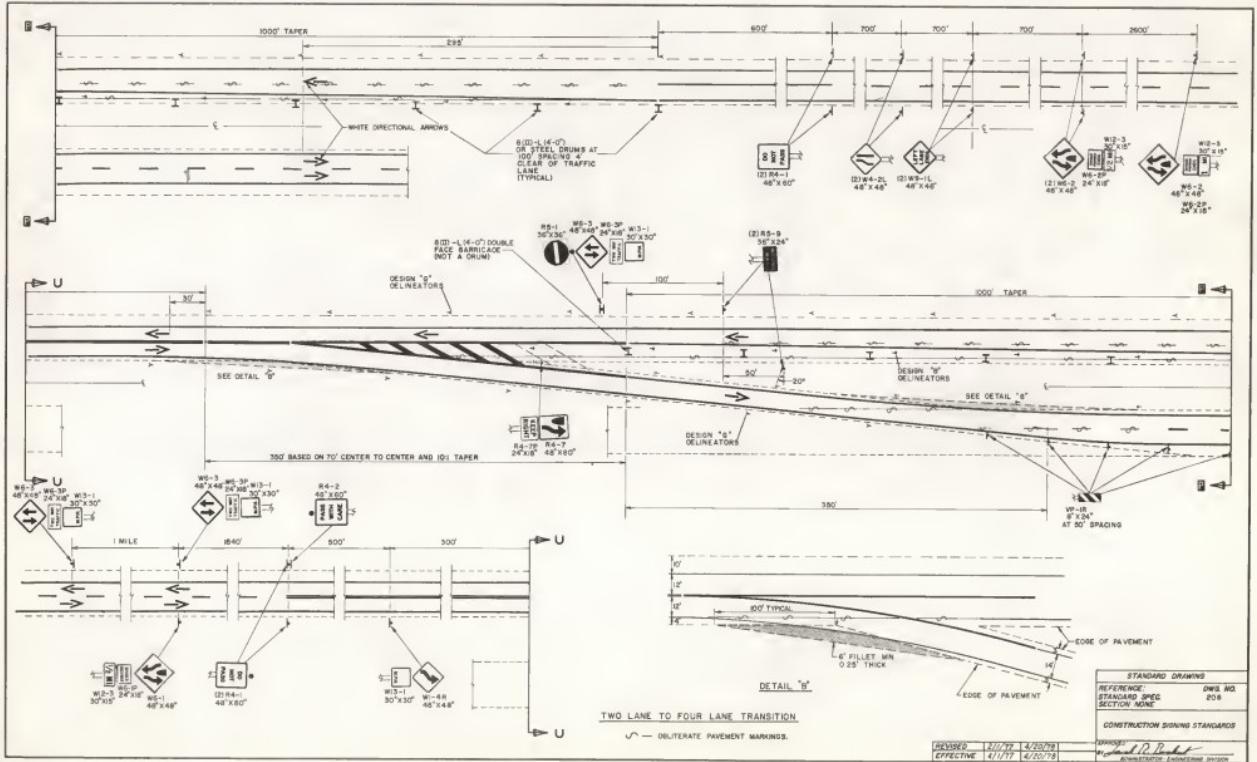
✓ OBLITERATE PAVEMENT MARKINGS

STANDARD DRAWING
REFERENCE NO. 203
SECTION NO. 203
CONSTRUCTION DRAWING STANDARDS

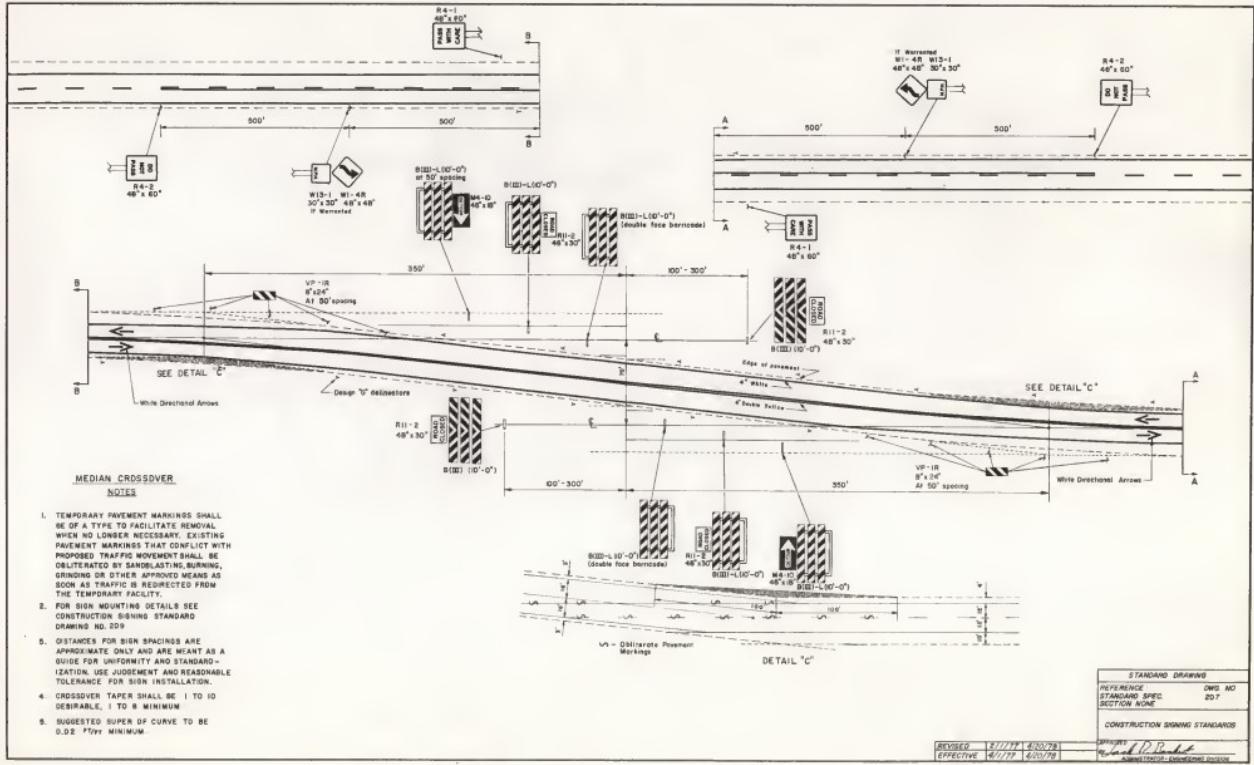
REVISED 3/1/77 4/20/78
EFFECTIVE 4/1/77 4/20/78

DRAFTED BY D. R. [Signature]
ADMINISTRATOR - ENGINEERING SECTION









MEDIAN CRDSSDVER

1. TEMPORARY PAVEMENT MARKINGS SHALL BE OF A TYPE TO FACILITATE REMOVAL WHEN NO LONGER NECESSARY. EXISTING PAVEMENT MARKINGS SHALL NOT BE ALTERED OR REMOVED UNLESS PROPOSED TRAFFIC MOVEMENTS SHALL BE DELITERATED BY SANDBLASTING, BURNING, GRINDING OR OTHER APPROVED MEANS AS DETERMINED BY THE STATE HIGHWAYS DIRECTOR FROM THE TEMPORARY FACILITY.
 2. FOR SIGN MOUNTING DETAILS SEE CONSTRUCTION SIGNING STANDARD DRAWING NO. 209
 3. DISTANCE FOR SIGN SHADING ARE APPROPRIATE ONLY AND ARE NOT AS A GUIDE. USE JUDGMENT AND STANDARDIZATION. USE JUDGMENT AND REASONABLE TOLERANCE FOR SIGN INSTALLATION.
 4. CROSSLAYER TAPE SHALL BE 1 IN DEEPARBLE, 1 IN TO 8 MINIMUM.
 5. SUGGESTED SUPER SLOP TO BE 0.06'-0.07' MINIMUM.

STANDARD DRAWING
REFERENCE DWG. NO.
STANDARD SPEC. 207
SECTION NONE

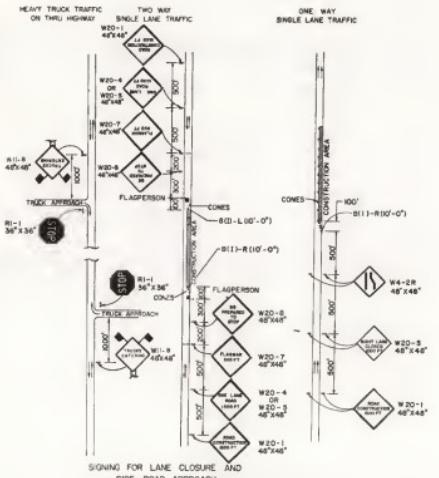
CONSTRUCTION SIGNING STANDARDS

REVISED 2/1/77 4/20/78
EFFECTIVE 4/1/77 4/20/78



HEAVY TRUCK TRAFFIC
OR THRU HIGHWAY

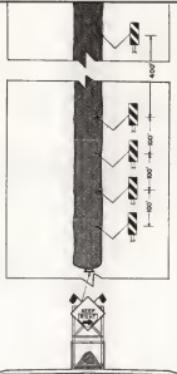
TWO WAY
SINGLE LANE TRAFFIC



SIGNING FOR LANE CLOSURE
AND
SIDE ROAD APPROACH

1. BARRICADES MAY BE OMITTED ON TWO WAY SINGLE LANE TRAFFIC WHEN PILOT CAR IS USED. THE VEHICLE SHOULD CARRY THE MESSAGE, "PILOT CAN FOLLOW ME" (W20-4), MOUNTED ON THE REAR OF THE VEHICLE.

2. TWO ORANGE PLATES SHALL BE MOUNTED ON ALL SIDE ROAD APPROACHES. THEY SHALL BE MOUNTED SO THEY WILL BE HIGHER THAN SIGN FACE AS SHOWN. FLAGS SHALL BE 12'X12" MINIMUM.

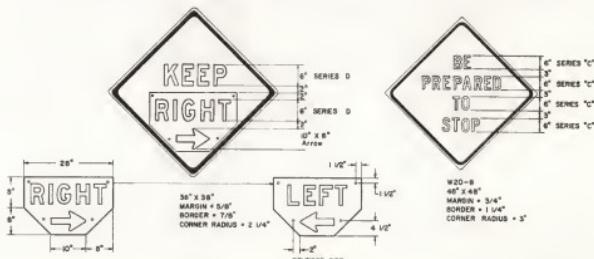


1. WINDOWS SHALL BE MARKED WITH VERTICAL PANEL, VP-1 RIGHT OR LEFT, AS REQUIRED. FOLLOWING THE APPROACH TREATMENT, PANELS SHALL BE SPACED AT 400' THROUGHOUT THE ENTIRE LENGTH OF THE WINDOW.

2. TWO 12'X12' ORANGE FLAGS SHALL BE MOUNTED ON ALL "KEEP RIGHT LEFT" SIGNS USED AT WINDOWS. FLAGS SHALL BE MOUNTED SO THEY WILL BE HIGHER THAN THE SIGN FACE.

3. IF A WINDOW IS NOT BEING ACTIVELY WORKED, VERTICAL PANELS MUST BE IN PLACE.

4. SEE STANDARD DRAWING NO 208 FOR TYPICAL PORTABLE SIGN MOUNTING.



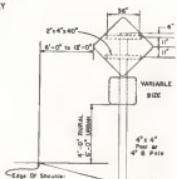
NOTE:
28" X 17" SHEET ALUMINUM PLATE WITH BLACK LEGEND
ON REFLECTORIZED ORANGE BACKGROUND.
LEGEND SHALL CONFORM TO F.H.W.A. STANDARD
ALPHABET AND SYMBOLS.
METAL PLATE SHALL BE ATTACHED WITH 4 METAL
SCREWS.

STANDARD DRAWING
REFERENCE
SECTION NO.
DRAWING NO.
SECTION NO.
EFFECTIVE DATE

REVISED 6/1/77 4/20/76
EFFECTIVE 6/1/77 4/20/78
DRAFTED D.B.
APPROVED D.B.
SUBMITTED D.B.

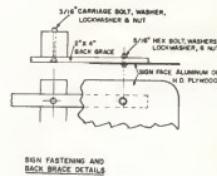


FOR CONSTRUCTION
SIGNING ONLY

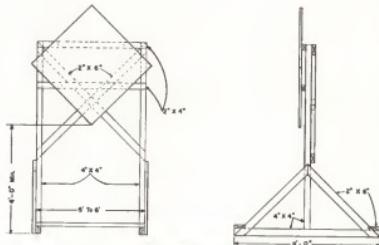
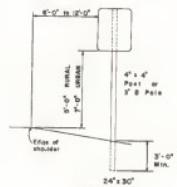
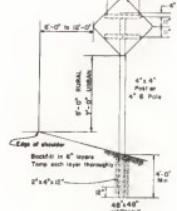
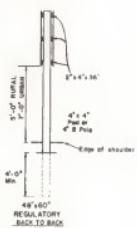


NOTE:
Distance signs may be made for 500ft, 1000ft, and 1500ft and be attached to any of the following signs.

R 11 - 2 ROAD CLOSED
W 20 - 4 ONE LANE ROAD
W 20 - 5 RIGHT LANE CLOSED
W 20 - 7 FLAGMAN



BACK FASTENING AND
BACK BRACE DETAILS



FRONT TYPICAL PORTABLE SIGN MOUNTING

SIDE

TYPICAL SIGN MOUNTING

- NOTES:**
- Lengths of posts or poles shall be determined by the engineer when construction stakes are set.
 - Posts and poles shall be drilled for breakaway if larger posts are required due to high wind areas. (see old deg 228)
 - Round posts shall require a 2" x 4" x 12" cleat to be nailed (use two 16d) 12" from the bottom of each pole.

CONSTRUCTION SIGN DETAILS

STANDARD DRAWING

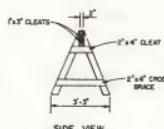
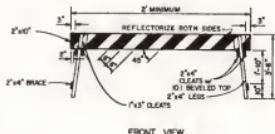
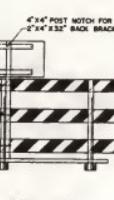
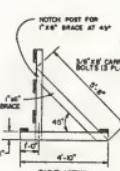
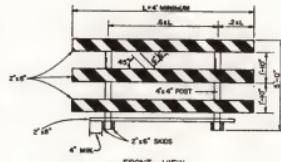
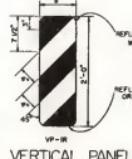
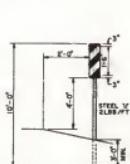
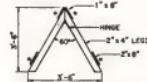
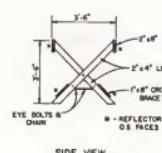
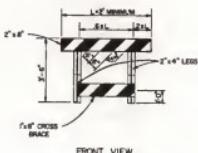
REFERENCE
SECTION NO.
SECTION NO.

CONSTRUCTION SIGNING STANDARDS -
CREATION AND SIGN DETAILS

REVISED 2/1/77 4/20/79
EFFECTIVE 4/1/77 4/20/79

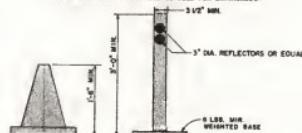
John P. Blodgett
DIVISION OF HIGHWAY ADMINISTRATION



B(I)-R**B(III)-L****B(II)-R**

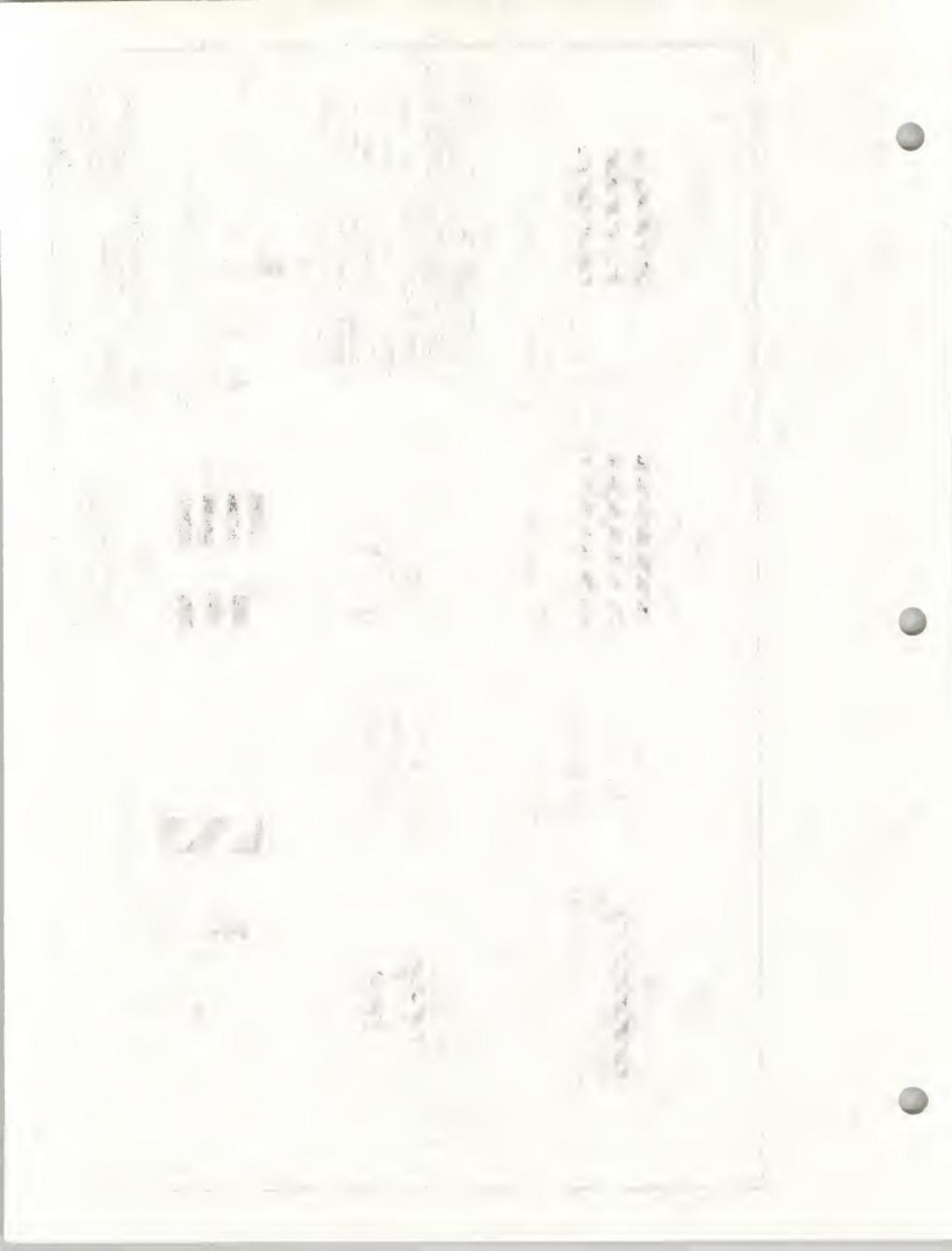
NOTES: BARRICADES

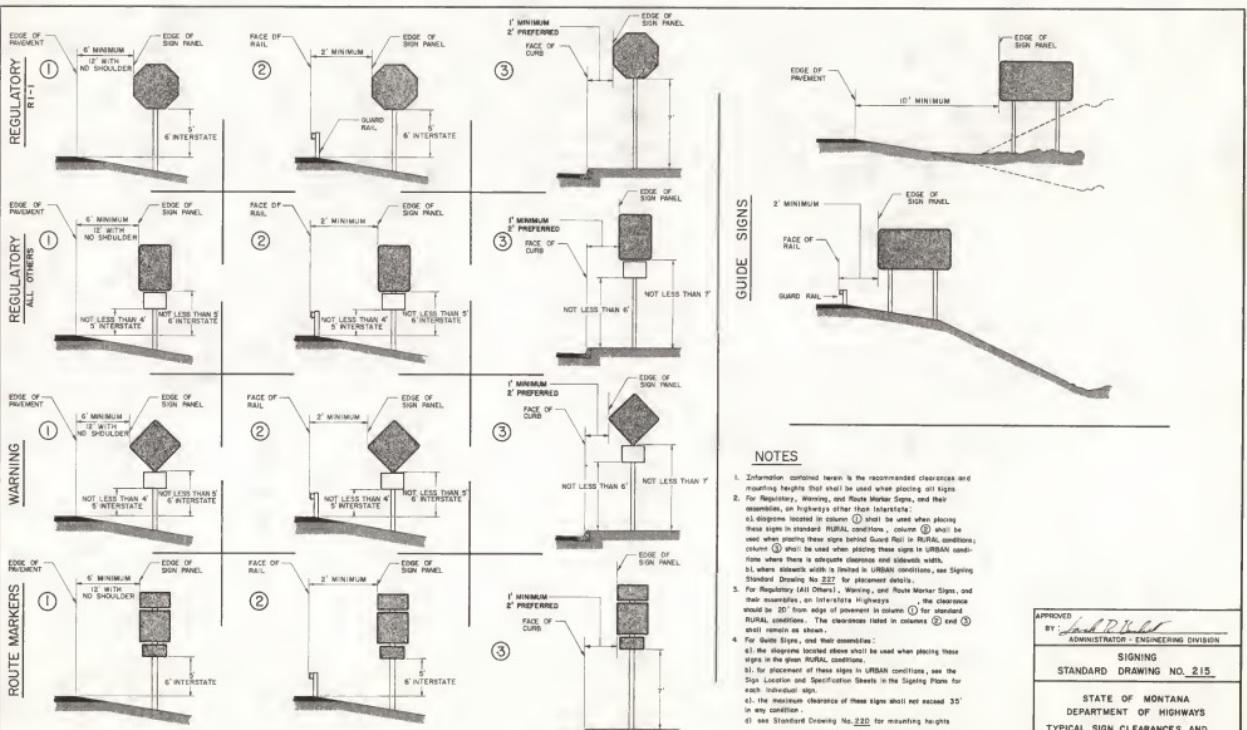
- ALL BARRICADES SHALL HAVE REFLECTORIZED ORANGE AND WHITE STRIPES, 6" IN WIDTH AT AN ANGLE OF 45° AS SHOWN. THE STRIPE SHALL POINT AWAY FROM THE SIDE TRAFFIC TO ALLOW THE BOX TRAFFIC TO PASS. BOTH FRONT AND REAR PANEL LEGS SHALL BE BEVELLED TO 2'x4' LEGS.
- ALL BARRICADES SHALL BE REFLECTORIZED WITH ORANGE AND WHITE SHEETING HOANTED TO A 1.5" ALUMINUM BACKING. AT LEAST ONE OF THESE ALUMINUM ALLOYS MUST CONFORM TO A.S.T.M. SPECIFICATION E-119. THIS REFLECTIVE ALUMINUM SHEETING SHALL BE SECURED WITH ALUMINUM NAILS.
- BARRICADES SHALL BE PAINTED WITH A COAT OF WHITE PAINT ACCORDING TO SECTION M-180.02, 14.9.1 STANDARD SPECIFICATIONS.
- SAFEGUARD OF PERTINENT WEIGHT SHALL BE USED TO HOLD BARRICADE IN PLACE.
- BARRICADES SHALL BE CONSTRUCTED OF STANDARD BRAD (INC. 2) OR BETTER 5/8" LUMBER. USE 5/8" CARPENTER BOLTS FOR ALL CONNECTIONS.
- WHERE 1x4" BARRICADES ARE TO FACE TRAFFIC FROM TWO DIRECTIONS, STRIPE ON THE SIDE FACING TRAFFIC SHALL BE TURNED 90°.
- BARRICADES OR VERTICAL PANELS DESIGNATED "H" SHALL BE PLACED IN THE CENTER OF THE LANE.
- Flexible guide post reflectors shall match the color of the adjacent lane line.
- Approved plastic pipe may be used for barricades.

**FLEXIBLE GUIDE POST**FLUORESCENT ORANGE
STANDARD DESIGNFLUORESCENT ORANGE
AS APPROVED BY
PROJECT MANAGER

STANDARD DRAWINGS	
REFERENCE	DRG. NO. STANDARD SPEC. SECTION NO.
CONTRACTOR DRAWING STANDARDS - BARRICADES	
REvised	4/1/77 4/1/77
Effective	4/1/77 4/1/77

FULL SIZE DRAWINGS OR OF DRAWN WITH BAND TO PROJECT MANAGER AND IN PLATE.
THERE SHALL BE AT LEAST THREE ORANGE AND TWO WHITE STRIPES ON EACH DRUM.
STRIPES MAY VARY FROM 4 TO 8 INCHES IN
WIDTH.





APPROVED
By: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

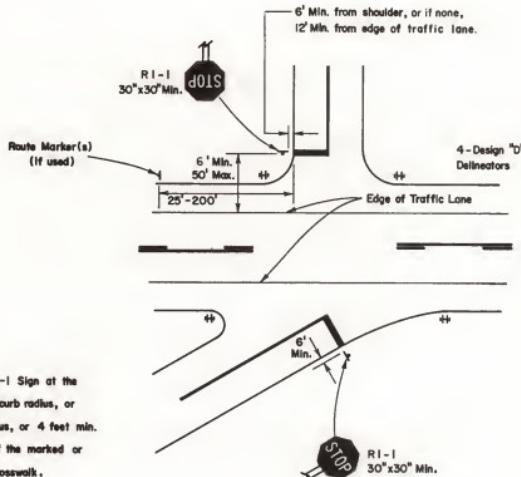
SIGNING
STANDARD DRAWING NO. 215

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL SIGN CLEARANCES AND
MOUNTING HEIGHTS

REVISED 10/8/74 4/1/79
EFFECTIVE 2/1/75 4/1/79

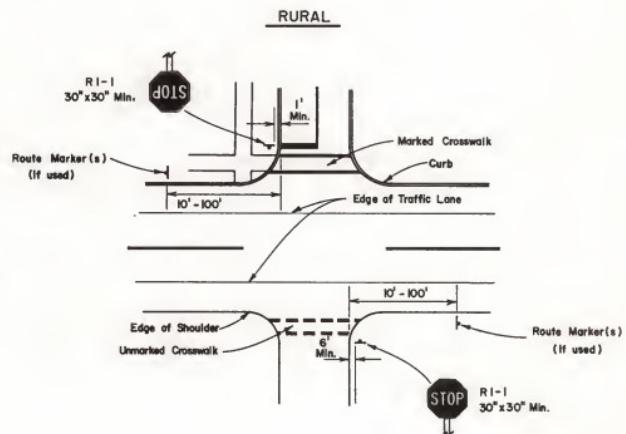


TYPICAL APPROACH ROAD SIGNING



NOTE:

Place RI-1 Sign at the beginning of curb radius, or shoulder radius, or 4 feet min. in advance of the marked or unmarked Crosswalk.



URBAN

SIGNING STANDARD DRAWING NUMBER 216	
TYPICAL RURAL AND URBAN APPROACH	

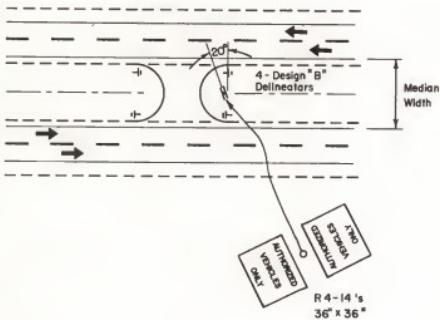
REVISED	4/1/79	APPROVED
EFFECTIVE	6/1/79	BY <i>J. P. B. [Signature]</i> ADMINISTRATOR - ENGINEERING DIVISION



MEDIAN U - TURN SIGNING

NOTES:

1. For Median Widths of 76 feet or less, the R4-14 Signs shall be mounted back to back. They shall be placed at the centerline of the Median and on the side of the U-Turn away from the nearest Interchange.
2. For Median Widths greater than 76 feet, the R4-14 signs shall be installed separately on both sides of the U-Turn at clearances specified in the Sign Location and Specifications.
3. For openings through Median Guard Rails, the sign post shall be placed in line with the Guard Rail Posts.

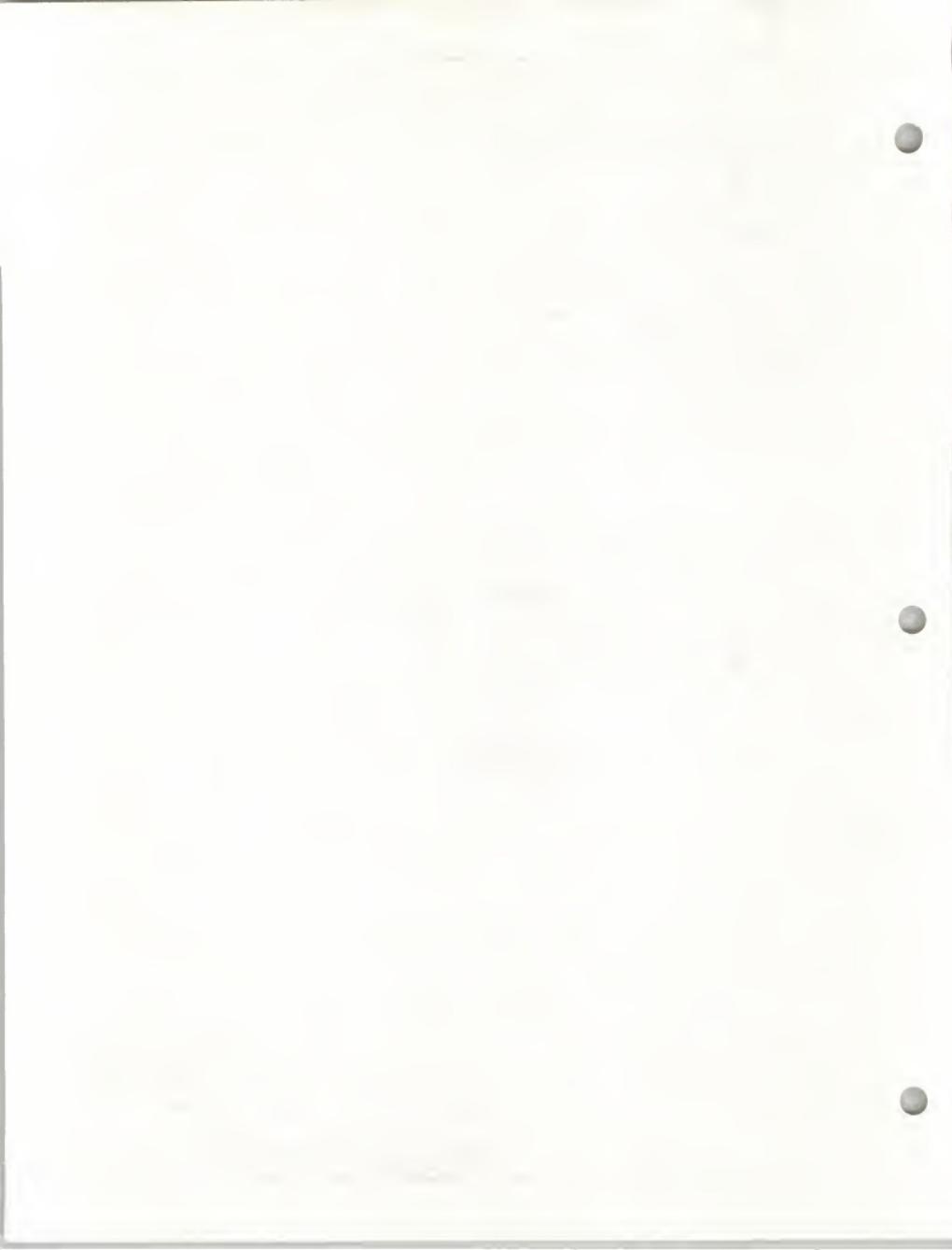


SIGNING STANDARD
DRAWING NUMBER 217

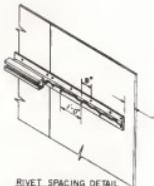
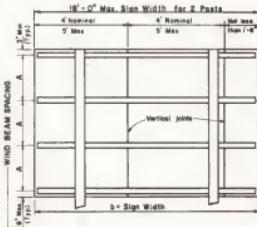
MEDIAN U-TURN SIGNING

REVISED	6/1/79	
EFFECTIVE	6/1/79	

APPROVED
BY *[Signature]*
ADMINISTRATOR-ENGINEERING DIVISION



ALUMINUM SHEET INCREMENT GUIDE SIGN DETAILS



NOTE:
A distance of 1-1/2" between centers on horizontal extruded T-section.

Rivets doubled (both sides of extruded T-aluminum) of horizontal and vertical joints in sheet aluminum face and at ends of extruded T-section.

NOTES GENERAL

ALL HORIZONTAL JOINTS SHALL OCCUR AT A 45° SECTION.
NO SPLINES ARE ALLOWED IN EXTRUDED "T" SECTIONS.

ALL SCREWS, BOLTS, AND LOCKWASHERS SHALL BE OF ALUMINUM ALLOY, STAINLESS STEEL, OR CARBON FLAT TOP STEEL.
ONLY ALUMINUM RIVETS SHALL BE USED.

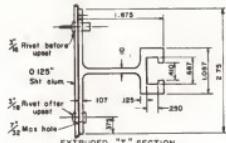
NOTES ALUMINUM SIGNS

1. ALL ALUMINUM SIGNS SHALL CONFORM TO SECTION RR, ART. M-320(I)(8) B & M-320(2)(A) OF THE MONTANA HIGHWAY CODE.
2. SIGNS LESS THAN 4'-0" HIGH AND 4'-0" LONG SHALL BE MADE OF A SINGLE SHEET OF ALUMINUM.
3. SIGNS UP TO, AND INCLUDING, 8'-0" HIGH SHALL HAVE NO HORIZONTAL JOINTS, AND NO SHEET SHALL BE LESS THAN 1'-8" WIDE.
4. SIGNS OVER 8'-0" HIGH MAY HAVE HORIZONTAL JOINTS, BUT NO HORIZONTAL JOINTS, NO SHEET SHALL BE LESS THAN 1'-8" WIDE OR 1'-0" HIGH.

5. TIGHTEN POST CLIP NUTS TO 225 IN/LBS TORQUE USING DRY, CLEAN THREADS.

PLYWOOD

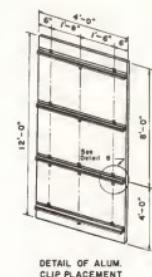
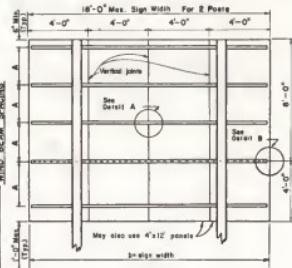
1. ALL PLYWOOD SIGNS SHALL CONFORM TO SECTION RR, ART. M-320(I)(8) C & M-320(2)(B) OF THE STANDARD SPECIFICATIONS.
2. SIGNS 4'-0" HIGH OR GREATER SHALL HAVE NO HORIZONTAL JOINTS IN HEIGHT.
3. SIGNS UNDER 4'-0" HIGH SHALL NOT HAVE HORIZONTAL JOINTS.
4. SIGNS WITH WIDTHS THAT ARE NOT IN MULTIPLES OF 4'-0" SHALL HAVE ONE PANEL ON INSIDE EDGE.
5. FOR SIGNS OVER 10'-0" IN HEIGHT, THE FULL HEIGHT MAY BE OBTAINED BY ONE PLYWOOD LENGTH PANEL, OR BY SCALLOPED IN LIEU OF USING STANDARD LENGTH PANEL AS SHOWN.
6. NO INDIVIDUAL PANEL SHALL BE SMALLER THAN 1'-8" WIDE BY 4'-0" HIGH.



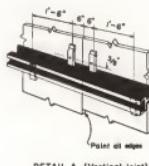
WIND BEAM CHART (PLYWOOD)		
WIND BEAM SPACING "A"	MATERIAL	MAXIMUM WIDTH (b)
1'-0"	1/4" U.C.	2'-0"
2'-0"	1/4" U.C.	2'-0"
3'-0"	1/4" U.C.	2'-0"
4'-0"	1/4" U.C.	2'-0"
5'-0"	1/4" U.C.	2'-0"
6'-0"	1/4" U.C.	2'-0"

WIND BEAM CHART (ALUMINUM)		
WIND BEAM SPACING "A"	MATERIAL	MAXIMUM WIDTH (b)
1'-0"	1/4" U.C.	2'-0"
2'-0"	1/4" U.C.	2'-0"
3'-0"	1/4" U.C.	2'-0"
4'-0"	1/4" U.C.	2'-0"

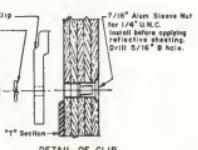
PLYWOOD SHEET INCREMENT GUIDE SIGN DETAILS



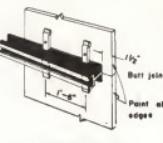
DETAIL OF ALUM CLIP PLACEMENT



DETAIL A (Vertical joint)



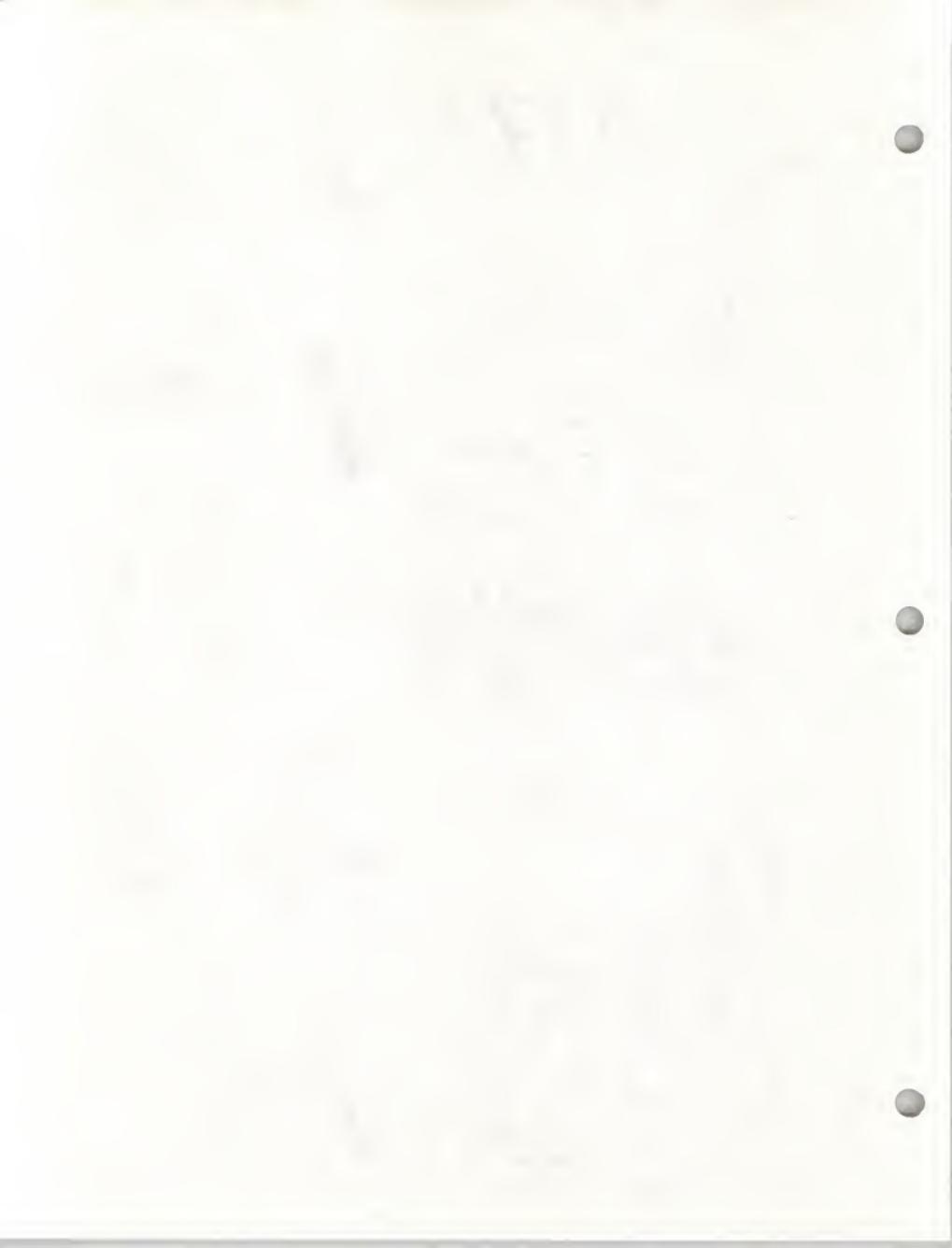
DETAIL OF CLIP



DETAIL B (Horizontal joint)

APPROVED	<i>[Signature]</i>
BY	ADMINISTRATIVE - ENGINEERING DIVISION
SIGNING	
STANDARD DRAWING NO.	219
STATE OF MONTANA	
DEPARTMENT OF HIGHWAYS	
GENERAL GUIDE SIGN	
CONSTRUCTION DETAILS	

REVISED /0/0/0
EFFECTIVE /J/7/75



See Signing Standard Drawing No. 212, for "L".

L = lateral clearance

7'-0" Mounting Height

If -0" Mounting Height

when Secondary Sign

is mounted below Major

Sign.

7'-0" Mounting Height on

Intrusive Guide Signs when

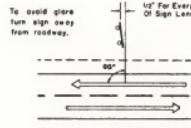
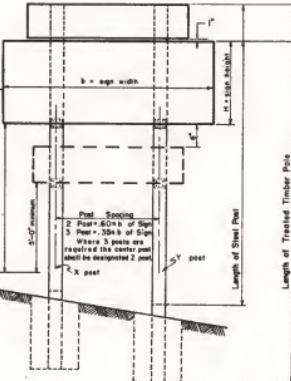
"L" is 20' or greater.

Edge of pavement
or face of curb.

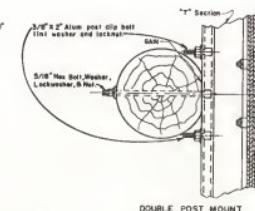
NOTE:

1. Mounting systems shown are typical. Other systems may be approved by the engineer.

2. All steel hardware shall be galvanized, stainless or cadmium plated.

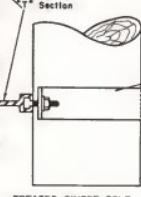
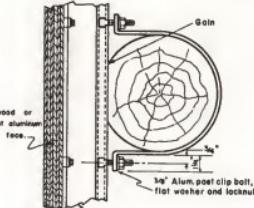


SKEW DIAGRAM

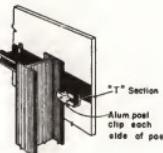


DOUBLE POST MOUNT

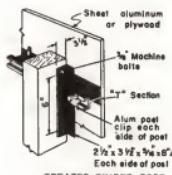
GUIDE SIGN MOUNTING DETAILS



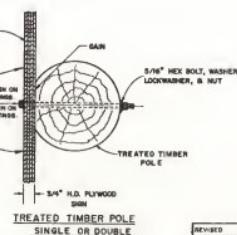
TREATED TIMBER POLE



STEEL POST



TREATED TIMBER POST



TREATED TIMBER POLE
SINGLE OR DOUBLE

APPROVED
By *Josh R. Holt*
ADMINISTRATOR - ENGINEERING DIVISION

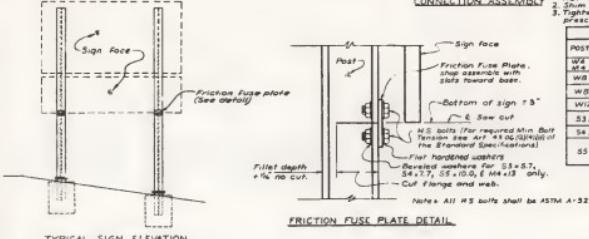
SIGNING
STANDARD DRAWING NO. 220.

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GUIDE SIGN MOUNTING AND
PLACEMENT DETAILS

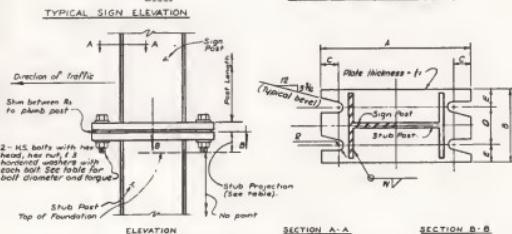
REVISED	10/1/79	4/1/79
EFFECTIVE	2/1/79	4/1/79



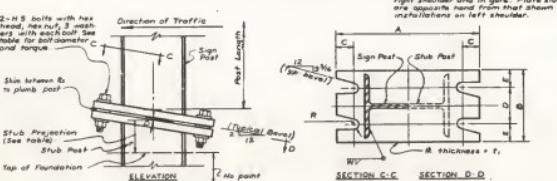
PROCEDURE FOR BASE CONNECTION ASSEMBLY



ERCTION FUSE PLATE DETAIL



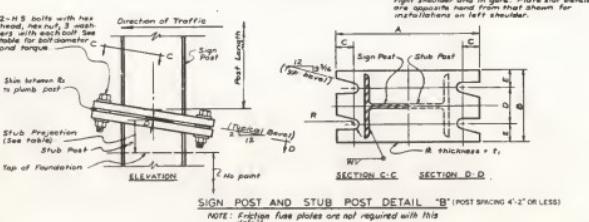
(B) SIGN POST AND STUB POST DETAIL "A" (POST SPACING GREATER THAN 4'-2")



SIGN POST AND STUB POST DETAIL "B" (POST SPACING 4'-2" OR LESS)
NOTE: Friction fuse plates are not required with this detail.

- Assemble post to stub with bolts and one flat washer between plates. Shim as required to plumb post.
- Post must be fastened to the foundation with nut using a center punch to prevent nut loosening.
- Loosen each bolt and retighten to prescribed torque in the same order of original tightening.
- DO NOT OVERTIGHTEN.

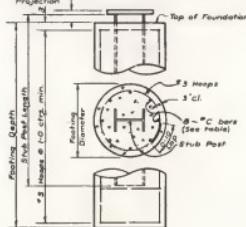
BASE CONNECTION DATA										FUSE PLATE DATA				FOUNDATION DATA		
POST SIZE	E. TORSOL	A	B	C	D	E	F	W	H	I	J	K	L	M	N	
W4-15	56 ¹ / ₂ " x 2 ¹ / ₂ "	25	5	1/8	2 ¹ / ₂ "	4	1/8	10	10	10	10	10	10	10	10	
W4-17	400 in-lbs	15	5	1/8	4	1/8	4	10	10	10	10	10	10	10	10	
W6-24	400 in-lbs	13	7	1/8	4	1/8	4	10	10	10	10	10	10	10	10	
W6-27	700 in-lbs	17	7	1/8	5	1/8	5	10	10	10	10	10	10	10	10	
W6-30	1000 in-lbs	20	8	1/8	5	1/8	5	10	10	10	10	10	10	10	10	
W6-33	1200 in-lbs	23	8	1/8	5	1/8	5	10	10	10	10	10	10	10	10	
W6-37	1400 in-lbs	23	8	1/8	5	1/8	5	10	10	10	10	10	10	10	10	
W6-40	1600 in-lbs	25	8	1/8	5	1/8	5	10	10	10	10	10	10	10	10	



FRICITION FUSE PLATE DETAIL

PLATE → Except as otherwise specified by the Engineer, structural steel shall be hot rolled, carbon steel, minimum yield strength 36 ksi, red lead or basic lead, silicon chrome and one (1) cold cast of carbon steel, minimum yield strength 36 ksi, in accordance with the Structural Steel Requirements of the Standard Specifications, not in contact with the concrete.

STUB



FOUNDATION DETAIL

REVISED 10/8/76 4/1/76

EFFECTIVE 2/1/78 6/1/78
APPROVED *[Signature]*
SUPERVISOR - BRIDGE SECT.

NOTES:
SPECIFICATIONS: Montana State Highway Commission
STANDARD DRAWINGS: See page 2 of this drawing.
CONTRACT DOCUMENTS: See page 2 of this drawing.
CONSTRUCTION: Work shall be performed in accordance with the Standard Specifications, and with the applicable codes, rules, regulations, and laws of the State of Montana and the Federal Highway Administration.
CONCRETE: Concrete shall be Class A or B according to the Standard Specifications.
STRUCTURAL STEEL: All requirements governing structural steel shall be in accordance with the Standard Specifications. To avoid oversight, these requirements shall apply to all structural steel.

APPROVAL: Shop stamp shall be accompanied by the list of materials and quantities required for the job.

PAYMENT: The unit price bid per yard for sheet piles shall be paid for each pile driven. Payment will be made for all concrete, reinforcing steel, welding, anchors, and other materials used in the construction of the bridge. Payment will be made for all posts shall be computed by halving the length of the post multiplied by the width of the post and multiplying by the unit price. Payment will be made for all posts shall be computed by halving the length of the post multiplied by the width of the post and multiplying by the unit price.

GUIDE SIGNS: For date sign placement and details, see Signing Standard Drawing No. 220.

APPROVED: *[Signature]*
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 223

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
BREAK AWAY & FOUNDATION DETAILS
FOR MULTIPLE GUIDE SIGN SUPPORTS
BRIDGE DRAWING NO. SH-2





Montana Department of Highways, Standard Specifications for Road and Bridge Construction, any amendments thereto, and Special Provisions shall govern unless otherwise noted.

Design conforms with A.A.S.H.T.O. Specifications for the Design and Construction of Structural Supports for Highway Signs.

Steel pipe shall conform to the requirements of A.S.T.M. A-53, Type E or S, Grade B.

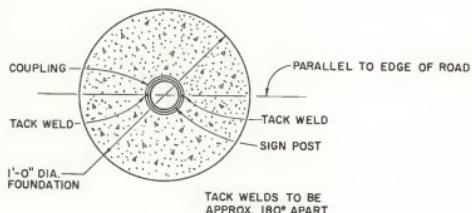
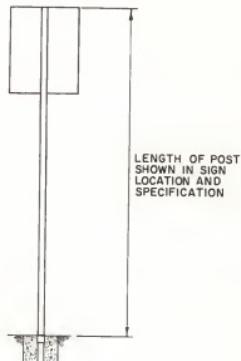
Concrete shall be Class A or D with wood float finish on top. Form top six (6) inches of foundation.

Galvanized pipe shall be galvanized as per A.S.T.M. A-123.

Pointed pipe shall receive one (1) shop coat and one (1) field coat of red lead paint or Basic Lead Silico-Chromate and one (1) field coat of aluminum paint, as specified in the Standard Specifications, on all surfaces not in contact with the concrete.

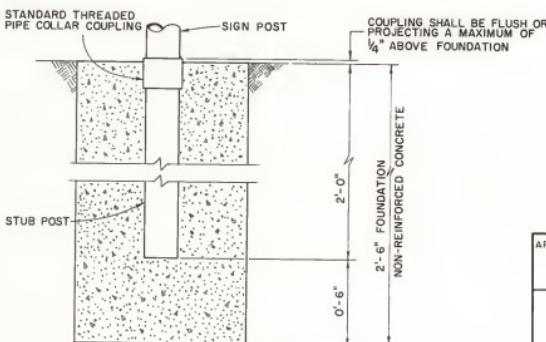
Shop drawings shall be approved by the Montana Department of Highways before fabrication is begun.

The unit price bid per pound for tubular steel posts shall be full payment for the steel posts and footings in place, including all concrete, welding, excavation, and all incidentals pertaining thereto. The weight of steel posts shall be computed by taking the length of post times the nominal weight per foot plus the weight of the breakaway device and stub shown in the table.



Pipe size	Nominal weight per foot of pipe	Weight of each breakaway device and stub post
2"	3.65	8.35
2 1/2"	5.79	13.67

For sign mounting detail see Signing Standard Drawing No. 226



APPROVED
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 225

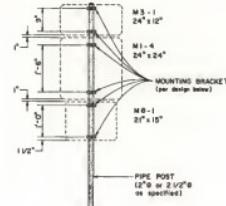
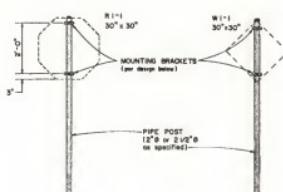
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
2" & 2 1/2" Ø PIPE POST
BREAKAWAY DETAIL

REVISED	4/1/79	
EFFECTIVE	6/1/79	

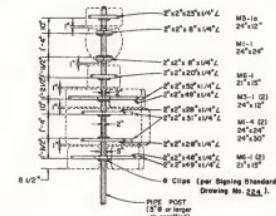
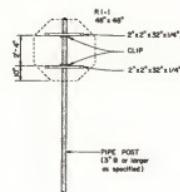


TYPICAL PIPE POST MOUNTING DETAILS

2" Ø AND 2-1/2" Ø PIPE



3" Ø AND LARGER PIPE

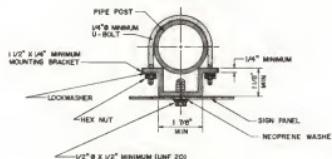


TYPICAL
MOUNTING
BRACKET
DETAILS
FOR 2"Ø AND 2 1/2"Ø PIPE

NOTES

A SUITABLE WATERSTOP CAN SHALL BE PLACED ON TOP OF ALL PIPE POSTS.
2" Ø AND 2 1/2" Ø REQUIRE A BREAK-AWAY DEVICE AS PER SIGNING STANDARD DRAWING NO. 225.

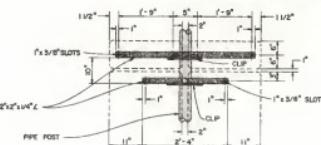
3"Ø AND LARGER PIPE REQUIRE A BREAK-AWAY DEVICE AS PER SIGNING STANDARD DRAWING NO. 224.
MATERIAL USED IN FABRICATION OF CLIP CLIPS AND ANGLE BRACKETS SHALL CONFORM TO SECTION 43 OF THE STANDARD SPECIFICATIONS.



ALL MATERIAL USED IN FABRICATION OF THIS TYPE MOUNTING BRACKET SHALL BE CADMIUM PLATED OR GALVANIZED STEEL.
BACK-TO-BACK MOUNTING WILL REQUIRE TWO BRACKETS WITH TWO 2 1/2" x 1/4" CARRIAGE BOLTS IN PLACE OF THE "U" BOLT.



TYPICAL MOUNTING DETAILS
FOR 3"Ø AND LARGER PIPE



THE LENGTH OF EACH J BRACKET SHALL DEPEND ON THE MOUNTING ASSEMBLY AND HOLE SPACING OF EACH SIGN. THE ASSEMBLIES SHOWN ARE TYPICAL INSTALLATIONS; ALL SIMILAR ASSEMBLIES SHALL BE ERECTED IN A LIKE MANNER.

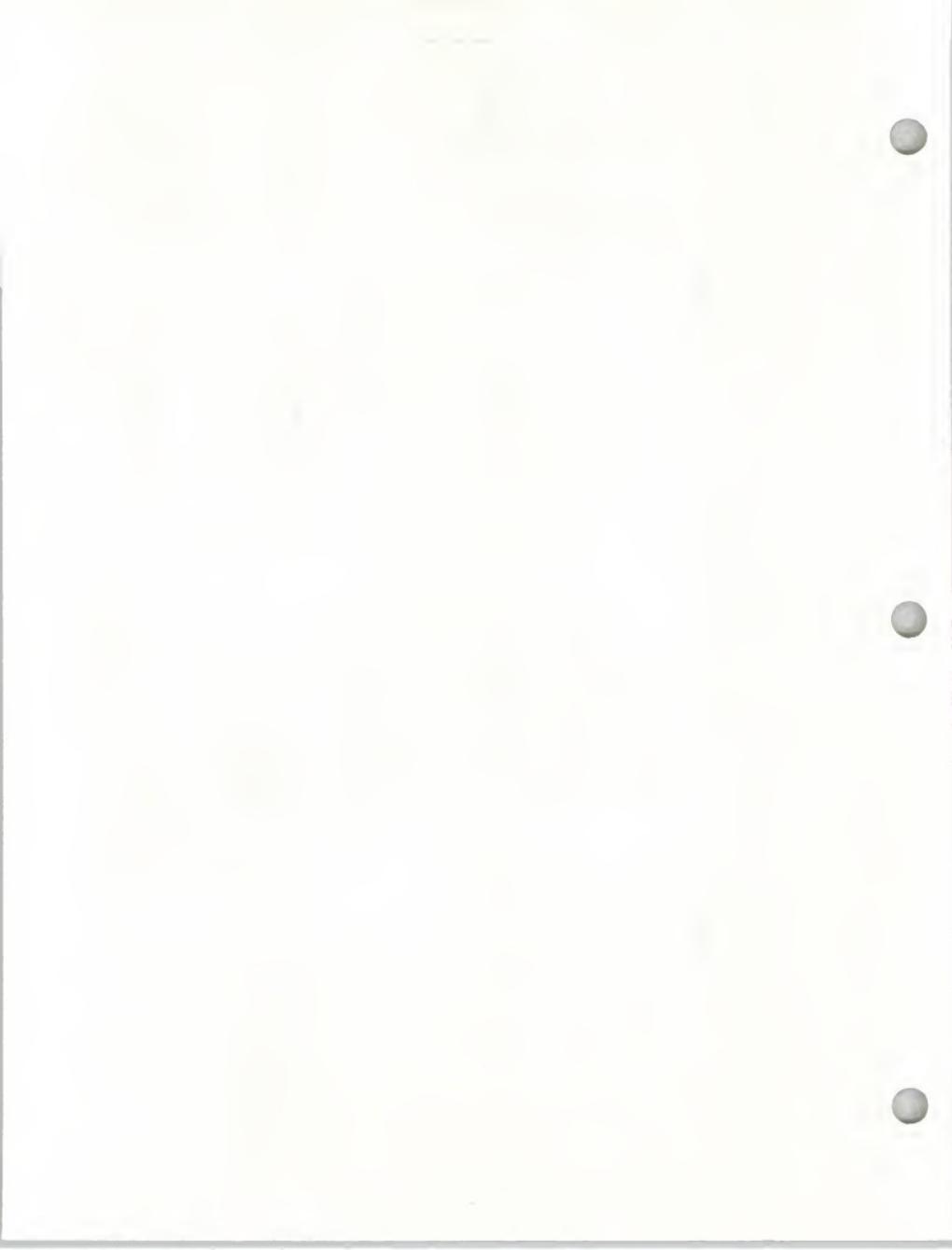


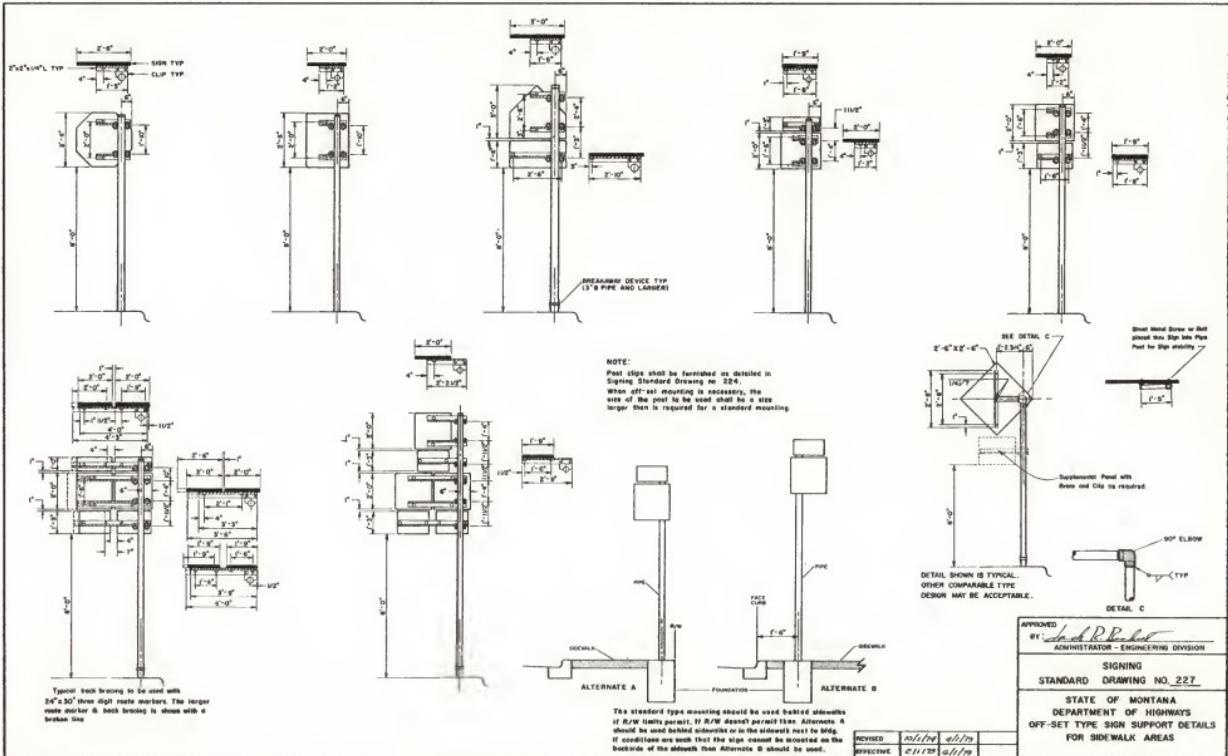
APPROVED
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

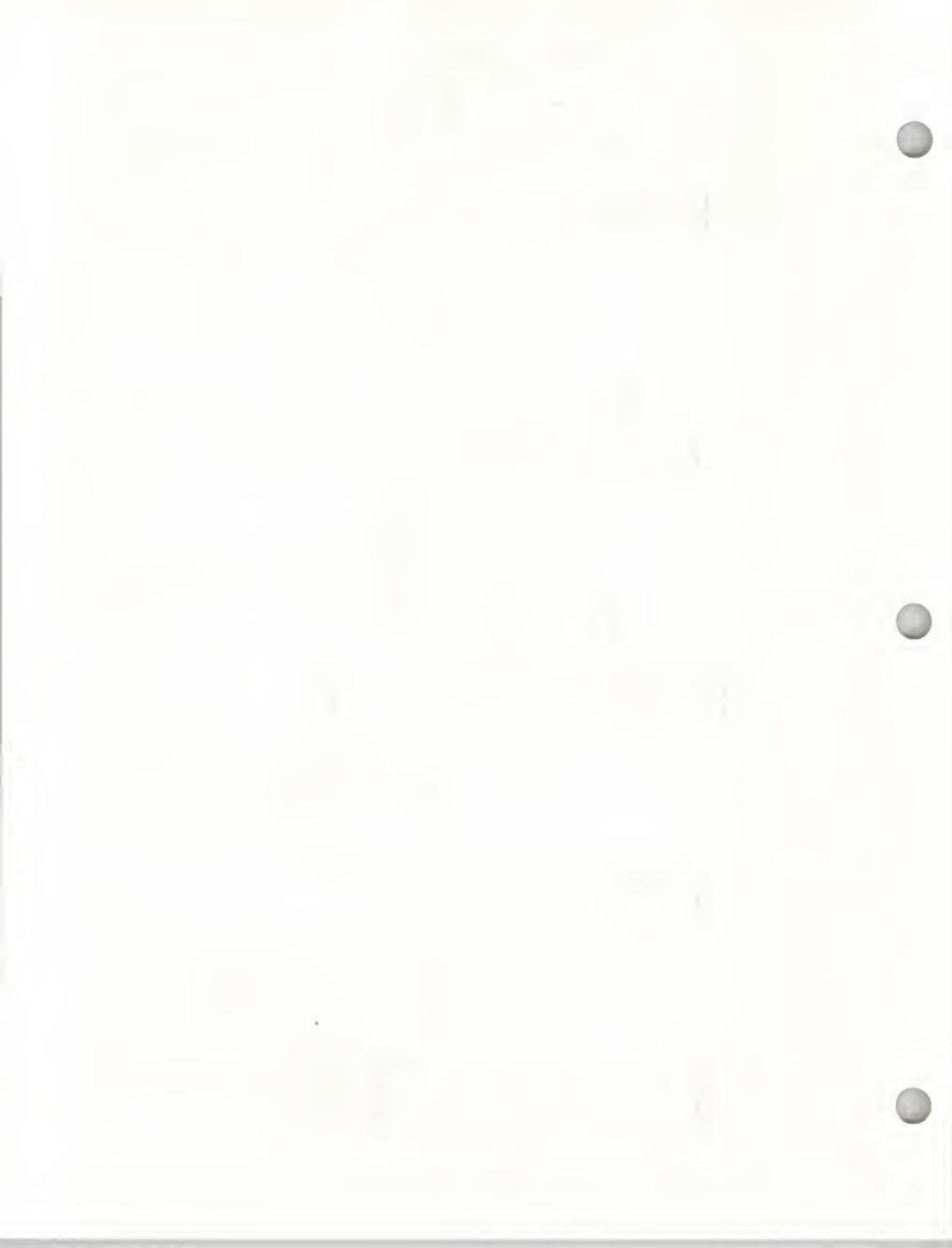
SIGNING
STANDARD DRAWING NO. 226

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL PIPE POST
MOUNTING DETAILS

REVISED	10/1/18	4/1/19
EFFECTIVE	2/1/18	4/1/19

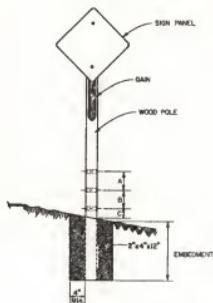






NOTES:

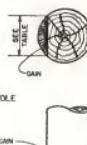
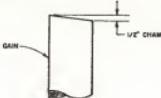
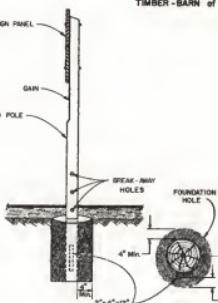
- All Timber Poles shall conform to the 1976 State of Montana Department of Highways Standard Specifications.
- All Timber Poles shall be full pressure treated as per Standard Specifications.
- All cutting, trimming, and boring of Treated Poles shall conform and be in accordance with the Standard Specifications.
- All Poles shall be galvanized on the sign side a minimum as shown in the Table below for 1/2 the length of each pole as shown.
- Break Away Details shall be standard for all Timber Wood



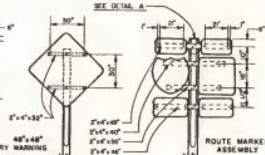
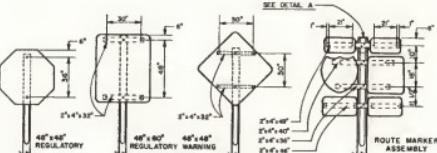
BREAK-AWAY AND FOOTING DETAILS

POLE SIZE	A	B	C	HOLE DIA.	EMBANKMENT	GAIN
4" TOP 6	—	—	—	—	4"	4"
4" TOP 6	—	—	—	—	3" - 4"	3" - 4"
4" TOP 6	—	1"	4"	2"	3" - 4"	4"
4" TOP 6	—	1"	4"	2"	4" - 4"	4"
CLASS 1	—	—	—	—	5" - 6"	4"
CLASS 2	—	1"	4"	2" - 4"	6" - 6"	4"
CLASS 3	—	1"	4"	2" - 4"	6" - 6"	4"
CLASS 2	6"	6"	4"	2" - 4"	6" - 6"	4"
CLASS 1	6"	6"	4"	2" - 4"	6" - 6"	4"

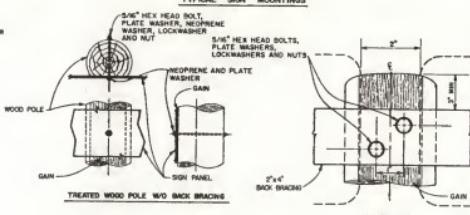
- Poles listed in the Table below, either on single or multiple sign supports.
- All Back Bracing material shall be of Standard No. 2 or better grade S4S lumber, and shall meet all spec's listed in Section M-320.01 of the Standard Specifications.
 - All bolts, nuts, and washers shall be of Aluminum, Stainless Steel, or Cadmium Plated Steel material.
 - A 2" x 4" x 12" board shall be attached 12" from the bottom of the Pole. Attachment shall be made by driving two nails (16d) through the 2" x 4" and into the Pole. The 2" x 4" shall be treated according to the Standard Specifications. The cost for all material and labor to accomplish this work shall be included in the Item - POLES - TREATED TIMBER - BARN of the contract.



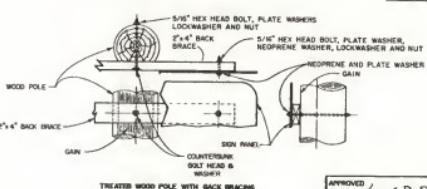
GAIN DETAIL



TYPICAL SIGN MOUNTINGS



DETAIL A



TREATED WOOD POLE WITH BACK BRACING

APPROVED
By *[Signature]*
ADMINISTRATION - ENGINEERING DIVISION

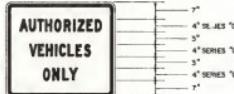
SIGNING
STANDARD DRAWING NO. 226

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TREATED TIMBER POLE
SIGN SUPPORT DETAILS

REVISED	10/1/79	4/1/79
EFFECTIVE	11/1/79	6/1/79



R 4-14



R 4-14
24" x 36"
Margin = 3/8"
Border = 3/8"
Corner Radius = 2 1/4"
Black Legend and Border on a
Reflectorized White Background.

R 10-9a



R 10-9a
24" x 36"
Margin = 3/8"
Border = 3/8"
Corner Radius = 1 1/2"
Black Legend and Border on a
Reflectorized White Background.

3"
5" SERIES "D"
2 1/4"
5" SERIES "D"
2 1/4"

3"
5" SERIES "D"
2 1/4"
5" SERIES "D"
2 1/4"

R 10-11



R 10-11
24" x 36"
Margin = 3/8"
Border = 3/8"
Corner Radius = 1 1/2"
Black Legend and Border on a Reflectorized White
upper portion, and a Reflectorized White Legend on
a Black Background lower portion.

3 1/2"
4" SERIES "B"
2"
4" SERIES "B"
2"
4" SERIES "B"
2"
4" SERIES "B"
2"
4" SERIES "B"
2 1/4"

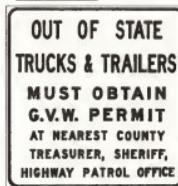
R 12-5



R 12-5
24" x 36"
Margin = 3/8"
Border = 3/8"
Corner Radius = 1 1/2"
Black Legend and Border on a
Reflectorized White Background.

3"
5" SERIES "D"
2"
5" SERIES "D"
2 1/4"
5" SERIES "D"
2 1/4"
5" SERIES "D"
2 1/4"
5" SERIES "D"
2 1/4"

R 13-2



R 13-2
60" x 80"
Margin = 1/2"
Border = 1/2"
Corner Radius = 3"
Black Legend and Border on a
Reflectorized White Background.

3"
5" SERIES "D"
3"
5" SERIES "D"

R 2-11



R 2-11 DIMENSIONS

A	B	C	D	E	F	G	H
24"	30"	36"	54 1/4"	64 1/4"	64 1/4"	64 1/4"	16 1/2"
45°	60°	54°	34 1/4"	45 1/4"	45 1/4"	45 1/4"	5"

Black Legend and Border on a
Reflectorized White Background.

R 12-5 P



R 12-5 P
15" x 25"
Margin = 3/8"
Border = 3/8"
Corner Radius = 1 1/2"
Black Legend and Border on a
Reflectorized White Background.

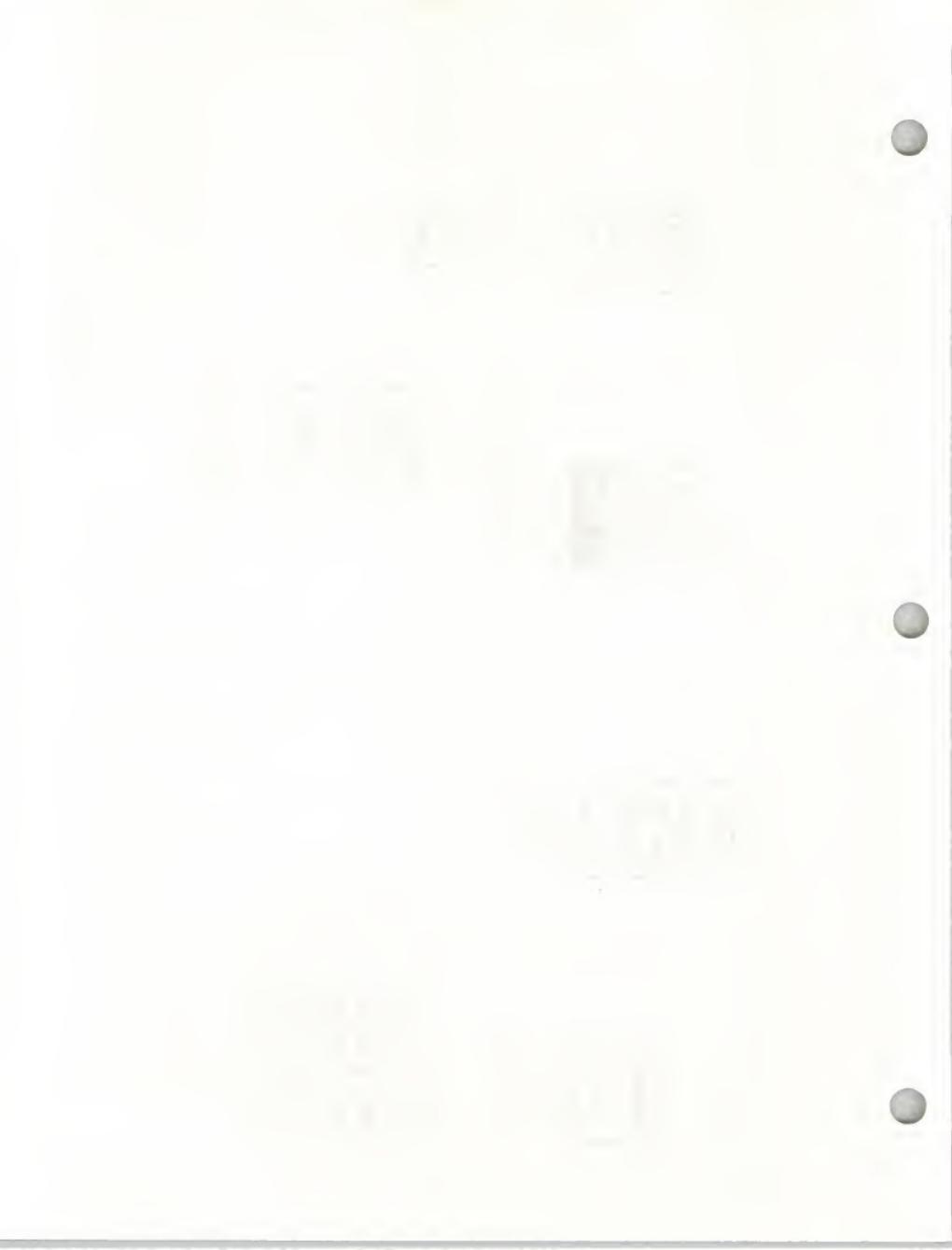
2 3/8"
5" SERIES "C" (Specify No.)
2 1/4"
3" SERIES "D"
2 3/8"

APPROVED
Jack P. Parker
BY
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 2.32

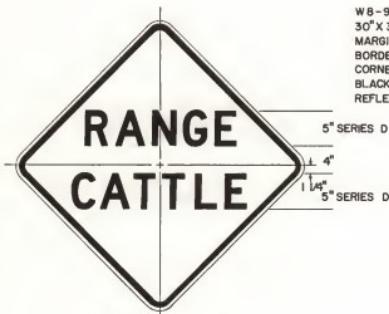
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN REGULATORY SIGNS

REVISED 10/07/99
EFFECTIVE 2/1/173





WB-9
30" X 30"
MARGIN = 1/2"
BORDER = 3/4"
CORNER RADIUS = 1 7/8"
BLACK LEGEND AND BORDER ON
REFLECTORIZED YELLOW BACKGROUND



WII-7
30" X 30"
MARGIN = 1/2"
BORDER = 3/4"
CORNER RADIUS = 1 7/8"
BLACK LEGEND AND BORDER ON
REFLECTORIZED YELLOW BACKGROUND



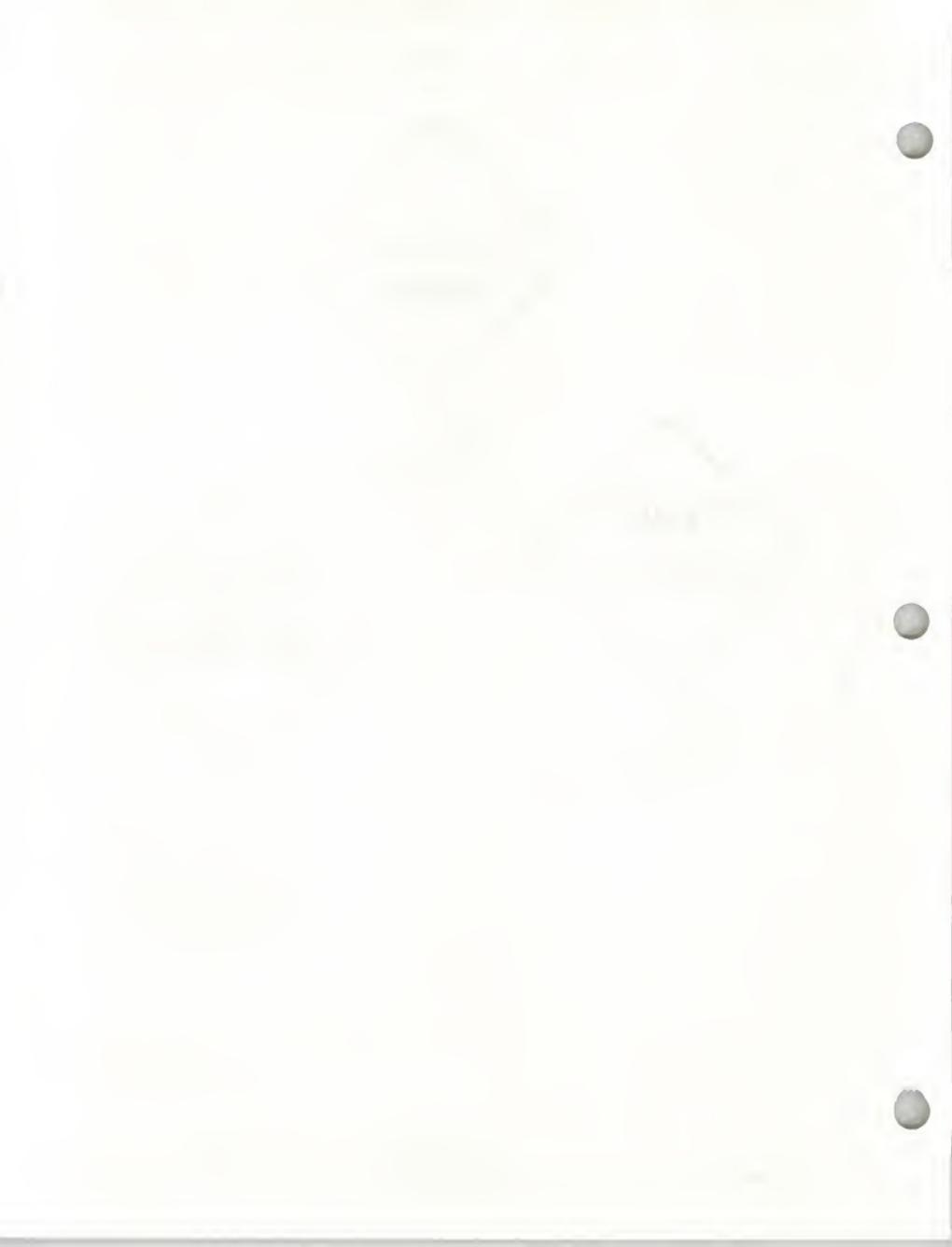
WII-B
SEE DIMENSIONS BELOW
BLACK LEGEND AND BORDER ON
REFLECTORIZED YELLOW BACKGROUND

A	C	D	F	G	H
30"	1/2"	3/4"	5" C	3"	1 7/8"
36"	5/8"	7/8"	6" C	3 1/2"	2 1/4"
48"	3/4"	1 1/4"	8" C	5"	3"

SIGNING STANDARD
DRAWING NUMBER 233

WARNING SIGNS
SPECIAL DESIGN

REVISED	4/1/79	APPROVED	<i>[Signature]</i>
EFFECTIVE	6/1/79	BY	ADMINISTRATOR-ENGINEERING DIVISION



PANELS

FOR ROUTE MARKER ASSEMBLY USE

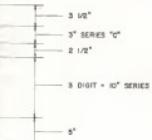
M 1 - 6 PRIMARY



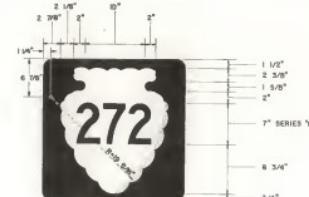
M 1 - 6
24" x 24"
Margin = None
Border = 1 1/2"
Corner Radius = 1 1/2"
Black Legend and Border on a
Reflectorized White Background.



M 1 - 6
24" x 24"
Margin = None
Border = 1 1/2"
Corner Radius = 1 1/2"
Black Legend and Border on a
Reflectorized White Background.



M 1 - 8 SECONDARY



M 1 - 6
24" x 24"
Margin = None
Border = See design sheet.
Corner Radius = 1 1/2"
Black Legend and Border on a
Reflectorized White Background.

NOTE:

All numerals used on Panels
and Shields shall be optically
centered about vertical centerline

SHIELDS

FOR USE ON GUIDE SIGNS

PRIMARY

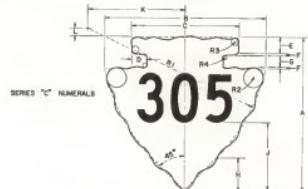


SERIES "D" MINERALS

	12" NUM.	12" NUM.	10" NUM.	10" NUM.
DIMENSIONS IN INCHES (1/16")				
A	21"	21"	24"	24"
B	24"	30"	24"	30"
C	6"	6"	6 1/2"	9 1/2"
D	1 1/2"	1 1/2"	2"	2 1/2"

Black Legend on a Reflectorized
White Background with no Border.

SECONDARY



SERIES "C" NUMERALS

NUMERAL SIZE	A	B	C	D	E	F	G	H	J	K	L	R1	R2	R3	R4
* 8" "C"	26"	28"	18 1/2"	5 1/2"	3"	5 1/2"	2"	10 1/2"	11"	2 1/4"	32 1/2"	3 3/4"	5 1/2"		
* 10" "C"	32"	32"	22 1/2"	14"	3 5/8"	5 1/2"	2 1/2"	10 1/2"	11"	2 1/4"	32 1/2"	3 3/4"	5 1/2"		
* 12" "C"	40"	40"	28"	4"	4 1/2"	10 1/2"	3"	20 1/2"	11"	2 1/4"	32 1/2"	3 3/4"	5 1/2"		

Black Legend on a Reflectorized White Background.

* To be used with standard 24" U.S. Shield.

* * To be used with standard 30" & 36" U.S. Shield.

* * * To be used with standard 42" U.S. Shield & all independent use.

APPROVED
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 234

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN PRIMARY &
SECONDARY ROUTE MARKER
PANELS AND SHIELDS

REVISED	10/8/76
EFFECTIVE	2/1/77



**FOOD - PHONE
GAS - LODGING
NEXT RIGHT**

10" UPPER CASE
10" UPPER CASE
10" UPPER CASE

DS-10
12'-0" X 8"-6"

**FOOD - PHONE
GAS - LODGING**

10" UPPER CASE
10" UPPER CASE

DS-12
12'-0" X 4"-0"

PHONE - GAS

10" UPPER CASE

DS-15
10'-0" X 8"-6"

**REST AREA
2 MILES**

12" UPPER CASE
10" NUMERAL
12" UPPER CASE

DS-11
12'-0" X 8"-0"

**REST AREA
NEXT RIGHT**

12" UPPER CASE
12" UPPER CASE

DS-12
12'-0" X 8"-0"

REST AREA

12" UPPER CASE
12" UPPER CASE
21 7/8" X 25" AT 45°
ARROW

DS-13
6'-6" X 6'-6"

**NEXT REST AREA
40 MILES**

8" UPPER CASE
8" UPPER CASE AND NUMERAL

DS-14
10'-6" X 8"-0"

**NEXT SERVICES
40 MILES**

8" UPPER CASE
8" UPPER CASE AND NUMERAL

DS-16
10'-0" X 8"-0"

**FOOD - PHONE
GAS - LODGING
HOSPITAL
CAMPING
NEXT RIGHT**

10" UPPER CASE
10" UPPER CASE
10" UPPER CASE
10" UPPER CASE
10" UPPER CASE

DS-14
12'-0" X 8"-0"

**FOOD - PHONE
GAS - LODGING
CAMPING
NEXT RIGHT**

10" UPPER CASE
10" UPPER CASE
10" UPPER CASE
10" UPPER CASE

DS-15
12'-0" X 8"-0"

NO SERVICES

8" UPPER CASE
DS-17
7'-0" X 1'-6"

**Welcome
to
Montana**

10.5" UPPER CASE
10" LOWER CASE
10" LOWER CASE
10" LOWER CASE

NE-40
9'-6" X 7"-0"

NOTES:

- ALL SIGNS SHOWN SHALL HAVE SERIES E MODIFIED REFLECTORIZED WHITE LEGEND.
 - SIGNS DS-II THRU DS-14 SHALL HAVE TYPE B OR C LETTERS ON REFLECTORIZED BLUE BACKGROUND EXCEPT DS-14 SHALL HAVE TYPE B REMOVABLE NUMBERS.
 - SIGNS DS-1 THRU DS-3 AND NE-4B SHALL HAVE TYPE B OR C LETTERS ON A REFLECTORIZED GREEN BACKGROUND.
 - SIGNS DS-2 THRU DS-17 SHALL HAVE TYPE B REMOVABLE LETTERS AND NUMBERS ON A REFLECTORIZED BLUE BACKGROUND EXCEPT DS-17 MAY USE TYPE C LETTERS.
 - SIGN RS-1 SHALL HAVE TYPE B OR C LETTERS ON A NON-REFLECTORIZED BLACK BACKGROUND.
 - SIGN DRAWINGS SHALL BE SUBMITTED PER THE SIGNING SPECIAL PROVISIONS.
- REvised 10/1/79 4/7/79
Effective 4/1/79 6/1/79

**WEIGH
STATION
1 MILE**

12" UPPER CASE
12" UPPER CASE
12" NUMERAL
10" UPPER CASE

DS-4
9'-0" X 6"-0"

**WEIGH
STATION
RIGHT LANE**

OPEN CLOSED

10" UPPER CASE
10" UPPER CASE
10" UPPER CASE
10" UPPER CASE

DS-2
12'-0" X 6"-0"

**WEIGH
STATION**

10" UPPER CASE
10" UPPER CASE
14 1/4" X 17 1/4" AT 45°
ARROW

DS-5
8'-0" X 6"-0"

**ALL TRUCKS
COMMERCIAL
VEHICLES
NEXT RIGHT**

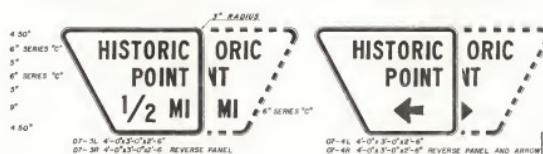
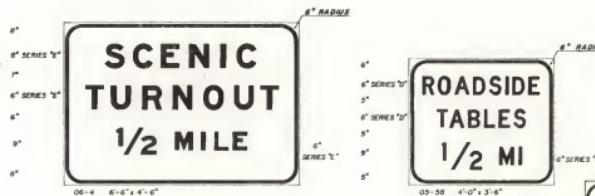
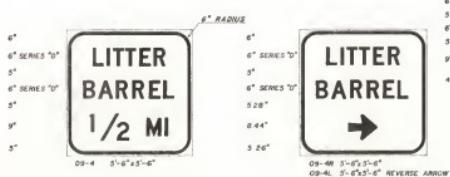
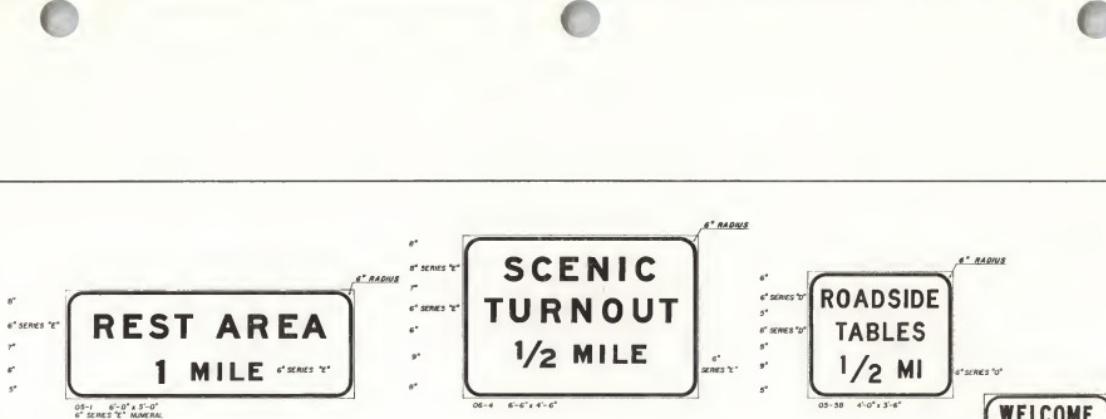
10" UPPER CASE
10" UPPER CASE
10" UPPER CASE
10" UPPER CASE

RS-1
12'-0" X 7"-0"

APPROVED
By *Arch R. Bell*
ADMINISTRATOR - ENGINEERING DIVISION
SIGNING
STANDARD DRAWING NO. 235

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
LAYDOWN DETAILS FOR STANDARD
INFORMATION SIGNS ON
INTERSTATE HIGHWAYS





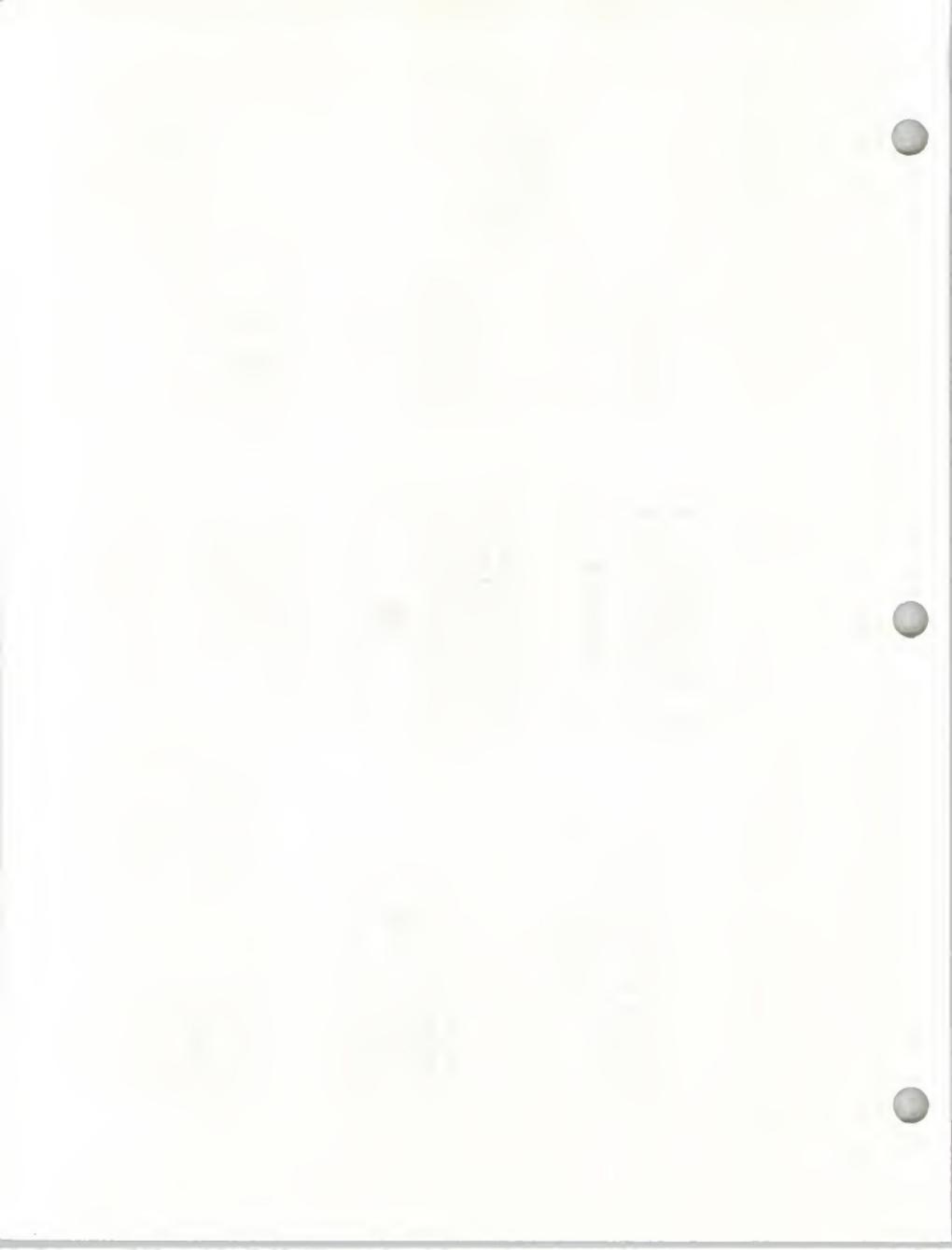
NOTE:
OS-8 & OS-206 SHALL HAVE REFLECTORIZED WHITE
LEGEND ON REFLECTORIZED BLUE BACKGROUND.
OS-11 & OS-12 SHALL HAVE REFLECTORIZED WHITE LEGEND ON
REFLECTORIZED BROWN BACKGROUND.
OS-48 & OS-50 SHALL HAVE REFLECTORIZED WHITE LEGEND
ON REFLECTORIZED GREEN BACKGROUND.

APPROVED
BY *John D. Baile*
ADMINISTRATOR - ENGINEERING DIVISION

STANDARD DRAWING NO. 236

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
LAYOUT DETAILS FOR STANDARD
INFORMATION SIGNS ON
PRIMARY & SECONDARY HIGHWAYS

REVISED AB/2/74
EFFECTIVE 2/1/75



D8-1a



$$5^{\circ} - 6^{\circ} \approx 4^{\circ} = 6^{\circ}$$

8"UG

800

σ⁰ u.c.

D8-2@



29P

8" u.c

8 UC

D8-291



HINGE DETAILS

R 13-1 a

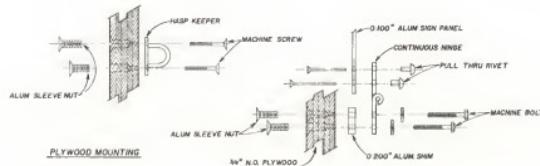


$$g^* = g^* \times g^* = g^*$$

87

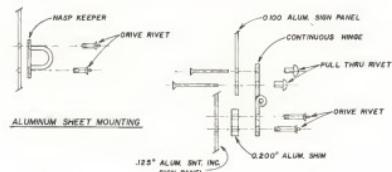
8^o u.c.

84



NOTES

- 1 **D-8-E** - **OB-2E** Sign shall have WHITE REFLECTORIZED legend on a DIRECT-LECTERIZED background
 - 2 **OB-2P** Sign shall have WHITE REFLECTORIZED legend on a **NonReflective** black background.
 - 3 The sign panel shall be **.060" HIGH DENSITY PLYWOOD or J25"** ALUMINUM SHEET INCREMENT The support panel shall be **.030"** SHEET ALUMINUM
 - 4 All hardware visible on the sign face shall be painted the same color as the sign
 - 5 Shop drawings shall be submitted and approved prior to fabrication.
 - 6 **OB-1** may have variable distance legend
 - 7 All legend shall have **SERIES "E"** MODIFIED letters
 - 8 One (1) secondary panel below **OB-2E** shall have WHITE REFLECTORIZED legend or a **Black** background (**OB-2EP**)
 - 9 The mounting height to the bottom of the **SECONDARY PANEL (OB-2EP)** shall be **.42'**



APPROVED
BY *Jack D. Baker*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
DRAWING NO. 237

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
WEIGH STATION SIGN DESIGN
DETAILS FOR PRIMARY HIGHWAYS



DIO-1
6
DIO-4



[POOL] PRIMARY
S201 SECONDARY
[I015] INTERSTATE

NOTES

1. IN CASE OF A NEW SURVEY PROJECT,

THE CONTRACTOR SHALL PLACE ROUTE

NUMBER IDENTIFYING STICKERS UPON

ALL SIGNS BEFORE FINAL ACCEPTANCE

OF THE PROJECT. IN CASE OF A

NEW SURVEY PROJECT, THE CONTRACTOR

SHALL PLACE THE NUMBER IDENTIFYING

STICKERS UPON ALL SIGNS.

UNLESS B OR ALUMINUM

SHEET INCREMENT ITEMS

OF THE SURVEY PROJECT.

2. THE STICKERS SHALL DISPLAY THE FEDERAL AID

ROUTE NUMBER AND THE

NAME OF THE STATE.

THE STICKERS SHALL

BE PLACED IN THE LOWER LEFT

CORNER OF THE MILEPOST

SHOULDERS ON THE EDGE

OF THE ROADWAY.

3. THE STICKERS SHALL

BE PLACED IN THE DIVISION

Maintenance Offices.

THE STICKERS ARE

MADE AND PROVIDED

FREE BY THE DEPARTMENT

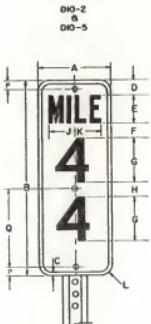
SIGN SHOP IN HELENA.

MILEPOST PANEL DIMENSION INFORMATION

	DIO-4	DIO-5	DIO-6
KEY	1-DIGIT	2-DIGIT	3-DIGIT
A	12.0	12.0	12.0
B	24.0	36.0	48.0
C	0.5	0.5	0.5
D	3.0	3.0	3.0
E	4.0	4.0	4.0
F	3.0	3.0	3.0
G	10.0	10.0	10.0
H	3.0	2.2	2.2
J	4.6	4.6	4.6
K	4.8	4.8	4.8
L	1.5R	1.5R	1.5R
P	2.0	2.0	2.0
Q	-	13.0	12.0
R	-	-	13.0

B DIGITS SHOULD BE OFFICALLY CENTERED ON VERTICAL % OF MILEPOST PANEL.
ABOVE VALUES ARE IN INCHES.

DIO-2
8
DIO-5



DIO-3
&
DIO-6



NOTES

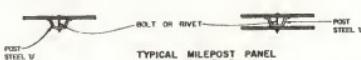
1. ALL MILEPOST PANEL SHALL HAVE A REFLECTORIZED WHITE LEGEND AND BORDER ON A REFLECTORIZED GREEN BACKGROUND.

2. ALL MILEPOST PANEL SHALL BE MOUNTED ON A 3 LB/FT MINIMUM WEIGHT OF POST EXCEPT THAT THE PANEL SHALL BE MOUNTED ON A 3 LB/FT MINIMUM STEEL U' POST, AS NOTED IN THE SIGNING PLANS.

3. 5/16" BOLT, NUT AND WASHER SHALL BE GALVANIZED OR CADMIUM PLATED. THE WASHERES SHALL BE REMOVED AFTER TIGHTENING. RIVETS SHALL BE 5/8" ALUMINUM OR CARMIM PLATED. BOLT OR RIVET HEADS SHALL BE PAINTED WITH BRILLIANT GREEN SIGN ENAMEL.

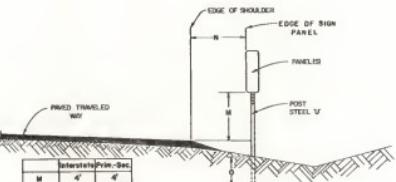
4. A MILEPOST SHALL NOT BE RELOCATED OR MOVED ONCE IT HAS BEEN PROPERLY PLACED.

SINGLE PANEL



DOUBLE PANEL

TYPICAL MILEPOST PANEL MOUNTING



Interstate/Prim. Sec.
M 4' 4"
N 6' 7" 2' 6"
O 2' Min. 2' Max.

* NOMINALLY IN LINE
WITH DELIMITATORS.

TYPICAL MILEPOST PLACEMENT

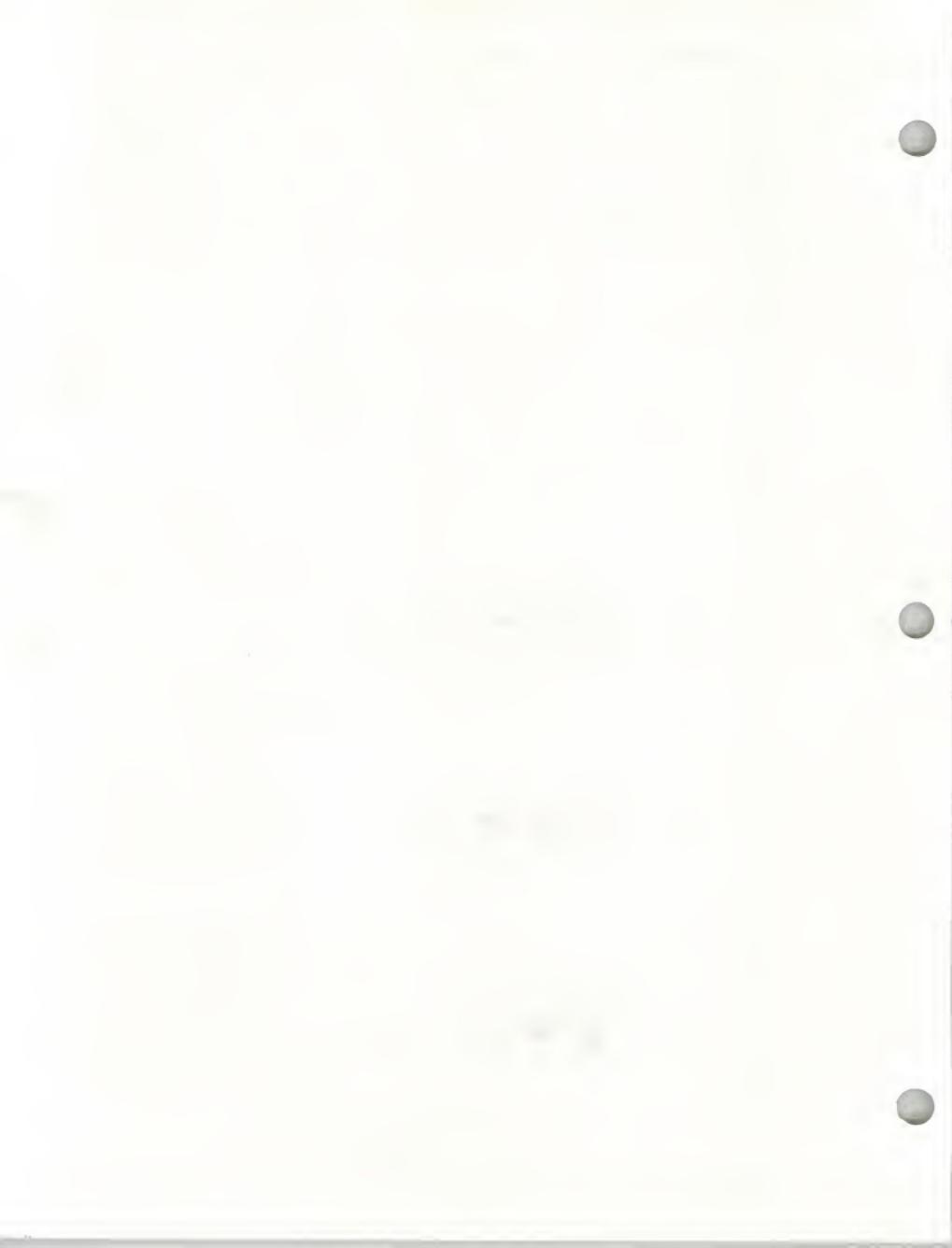
APPROVED
BY *Jack D. Babb*
ADMINISTRATOR - ENGINEERING DIVISION

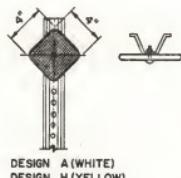
SIGNING
STANDARD DRAWING NO. 241

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

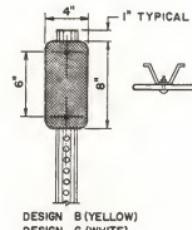
MILEPOST DETAILS

REVISED *10/6/78*
EFFECTIVE *2/1/79*

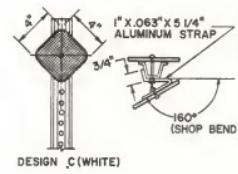




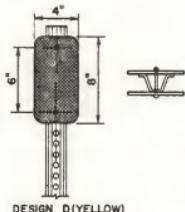
DESIGN A (WHITE)
DESIGN H (YELLOW)



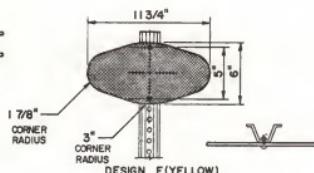
DESIGN B (YELLOW)
DESIGN G (WHITE)



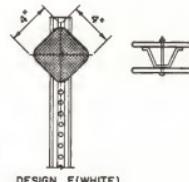
DESIGN C (WHITE)



DESIGN D (YELLOW)



DESIGN E (YELLOW)



DESIGN F (WHITE)

TABLE II

DELINERATOR	LEGEND
DESIGN "A"	→
DESIGN "B"	↔
DESIGN "C"	↙ ↘
DESIGN "D"	↔ ↔
DESIGN "E"	↔ ↔
DESIGN "F"	↑
DESIGN "G"	↖ ↗
DESIGN "H"	→

SIGNING STANDARD
DRAWING NUMBER 242

DELINERATOR DESIGN
AND LEGEND

REVISED	4/1/79
EFFECTIVE	6/1/79

APPROVED
By *D. R. Robert*
ADMINISTRATOR-ENGINEERING DIVISION



NOTES

1. REFLECTIVE SHEETING SHALL BE FURNISHED ACCORDING TO STANDARD SPECIFICATIONS FOR ENCAPSULATED LENS WIDE ANGLE. POSITION DELINEATOR FACES PERPENDICULAR TO TANGENT TO CENTER LINE OF CURVE AS SHOWN IN FIGURE B.
2. DELINEATORS SHALL BE MOUNTED ON METAL U POSTS WITH 3/16" CADMIUM PLATED BOLT(S). A MINIMUM OF 12 1/4" DIAMETER HOLES SHALL BE DRILLED OR PUNCHED ON 1" CENTERS FROM THE TOP OF THE POST. 1/4" SQUARE HOLES MAY BE USED, IF SQUARE HOLES ARE USED A LARGE HEADED BOLT OR AN APPROPRIATE WASHER MUST BE USED. THREADS SHALL BE JAMMED AFTER TIGHTENING THE NUT TO PREVENT REMOVAL.
3. DELINEATORS SHALL BE PLACED AT A CONSTANT CLEARANCE FROM THE EDGE OF PAVEMENT EXCEPT WHERE GUARDRAIL OR OTHER OBSTRUCTION INTERFERES. DELINEATORS SHALL THEN BE IN LINE WITH THE INSIDE EDGE OF THE OBSTRUCTION. CLEARANCE FOR DELINEATORS SHALL BE 6'-0" ON INTERSTATE HIGHWAYS, 2'-0" TO 6'-0" ON PRIMARY AND SECONDARY HIGHWAYS AS DETERMINED BY THE PROJECT ENGINEER. STANDARD MOUNTING HEIGHT SHALL BE 4'-0". POST LENGTHS SHALL BE SUPPLIED TO MAINTAIN THE PROPER MOUNTING HEIGHT AND A MINIMUM OF 18" EMBODIMENT.
4. DELINEATORS SHALL BE SPACED ACCORDING TO THE DISTANCES FOUND IN TABLE I. DELINEATORS THAT ARE TO BE SPACED DIFFERENTLY WILL BE NOTED IN THE PLANS AS TO THEIR PLACEMENT. IN FIGURE A IF "F" DISTANCE IS GREATER THAN 20' ADD ONE REGULAR DELINEATOR IN AT "A" SPACING. UNDER NORMAL SPACING, SHOULD A DELINEATOR FALL WITHIN A CROSSROAD OR APPROACH, IT MAY BE MOVED IN EITHER DIRECTION A DISTANCE NOT TO EXCEED ONE QUARTER OF THE NORMAL SPACING. DELINEATORS STILL FALLING WITHIN SUCH AREAS SHALL BE ELIMINATED.
5. FIGURE C IS A FIELD METHOD FOR DETERMINING DEGREE OF HORIZONTAL CURVES.
6. ALL DELINEATOR REFLECTORS SHALL HAVE 3/4" CORNER RADII EXCEPT DESIGN "E".
7. THE DELINEATOR REFLECTOR SHALL BE MOUNTED 1" BELOW THE TOP OF THE METAL U POST.



FIGURE A
SEE TABLE I FOR SPACING VALUES

TABLE I

DEGREE OF CURVE	SPACING ON CURVE		SPACING ON BOTH APPROACH TANGENTS		
	A	B	C	D	E
0° TO 30'	300'	400'	400'	400'	400'
30' TO 1°	300'	400'	400'	400'	400'
1°+ TO 2°	225'	400'	400'	400'	400'
2°+ TO 3°	160'	320'	400'	400'	400'
3°+ TO 4°	130'	260'	400'	400'	400'
4°+ TO 6°	110'	220'	330'	400'	400'
6°+ TO 8°	90'	185'	275'	400'	400'
8°+ TO 12°	75'	150'	230'	300'	400'
12°+ TO 20°	60'	125'	185'	300'	400'
20°+ PLUS	45'	90'	140'	275'	400'



FIGURE B

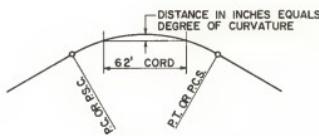


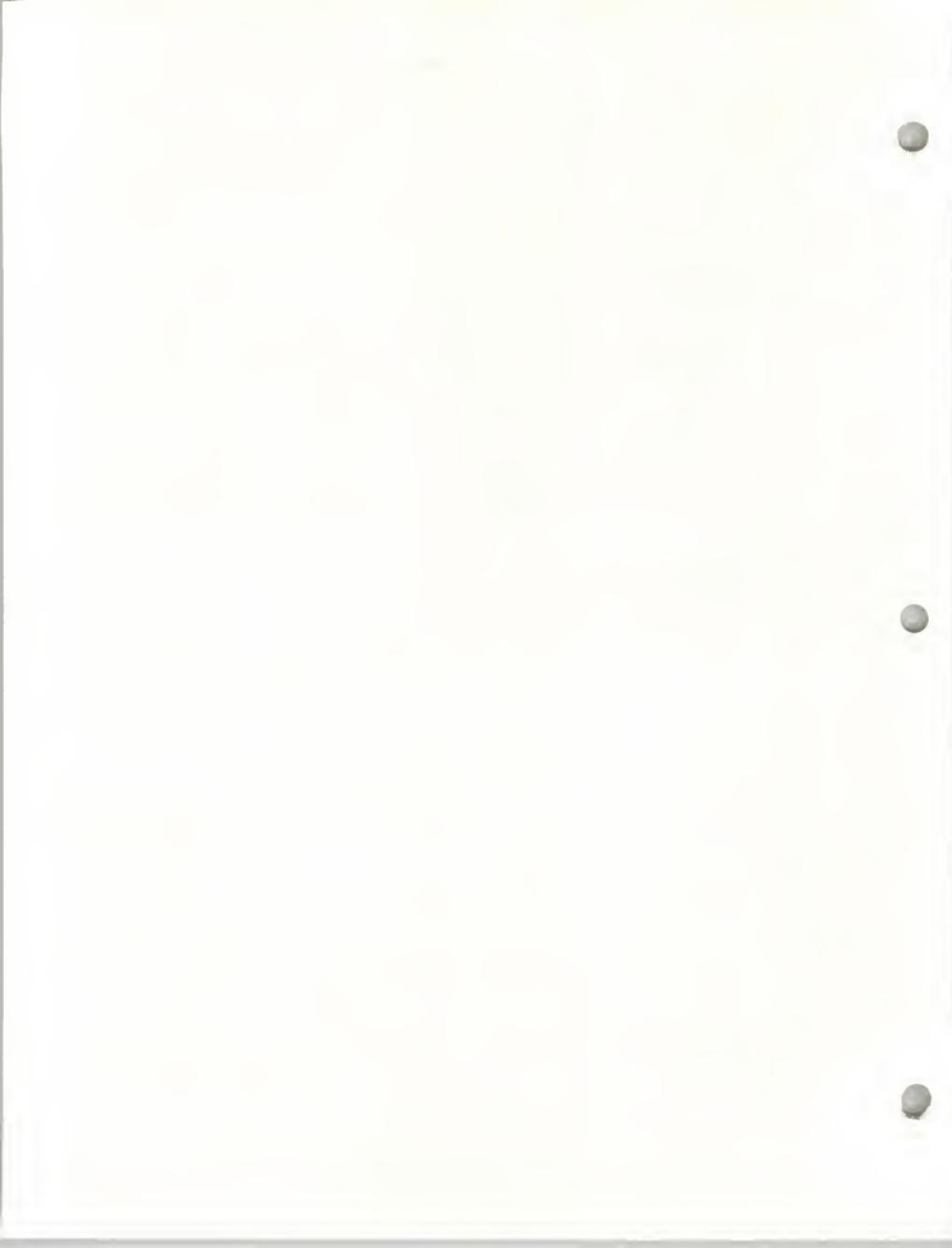
FIGURE C

SIGNING STANDARD
DRAWING NUMBER 243

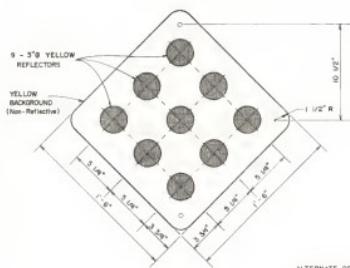
DELINERATOR PLACEMENT
DETAILS AND NOTES

APPROVED
By *[Signature]*
ADMINISTRATOR-ENGINEERING DIVISION

REVISED	4/1/79
EFFECTIVE	6/1/79

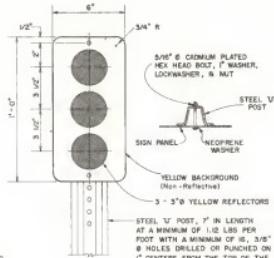


TYPE 1
X 3-2



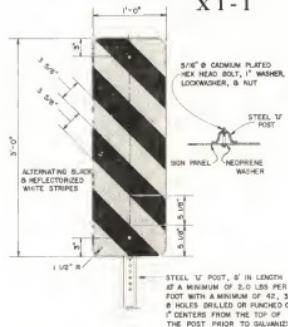
ALTERNATE DESIGNS FOR TYPE 1 AND
TYPE 2 OBJECT MARKERS ARE ALL
YELLOW REFLECTORIZED PANELS OF
THE SAME SIZE

TYPE 2
X 3-3



STEEL U POST, 7' IN LENGTH
AT A MINIMUM OF 1.12 LBS PER
FOOT WITH A MINIMUM OF 16, 3/8"
HOLE DRILLED OR PUNCHED ON
1" CENTERS FROM THE TOP OF THE
POST PRIOR TO GALVANIZING

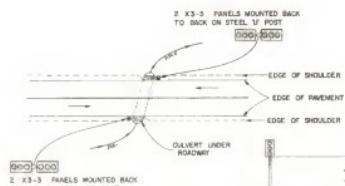
TYPE 3
X 1-1



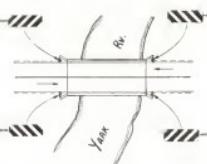
STEEL U POST, 8' IN LENGTH
AT A MINIMUM OF 2.0 LBS PER
FOOT WITH A MINIMUM OF 16, 3/8"
HOLE DRILLED OR PUNCHED ON
1" CENTERS FROM THE TOP OF THE
POST PRIOR TO GALVANIZING



TYPICAL USE AND PLACEMENT



TYPICAL USE AND PLACEMENT



TYPICAL USE AND PLACEMENT



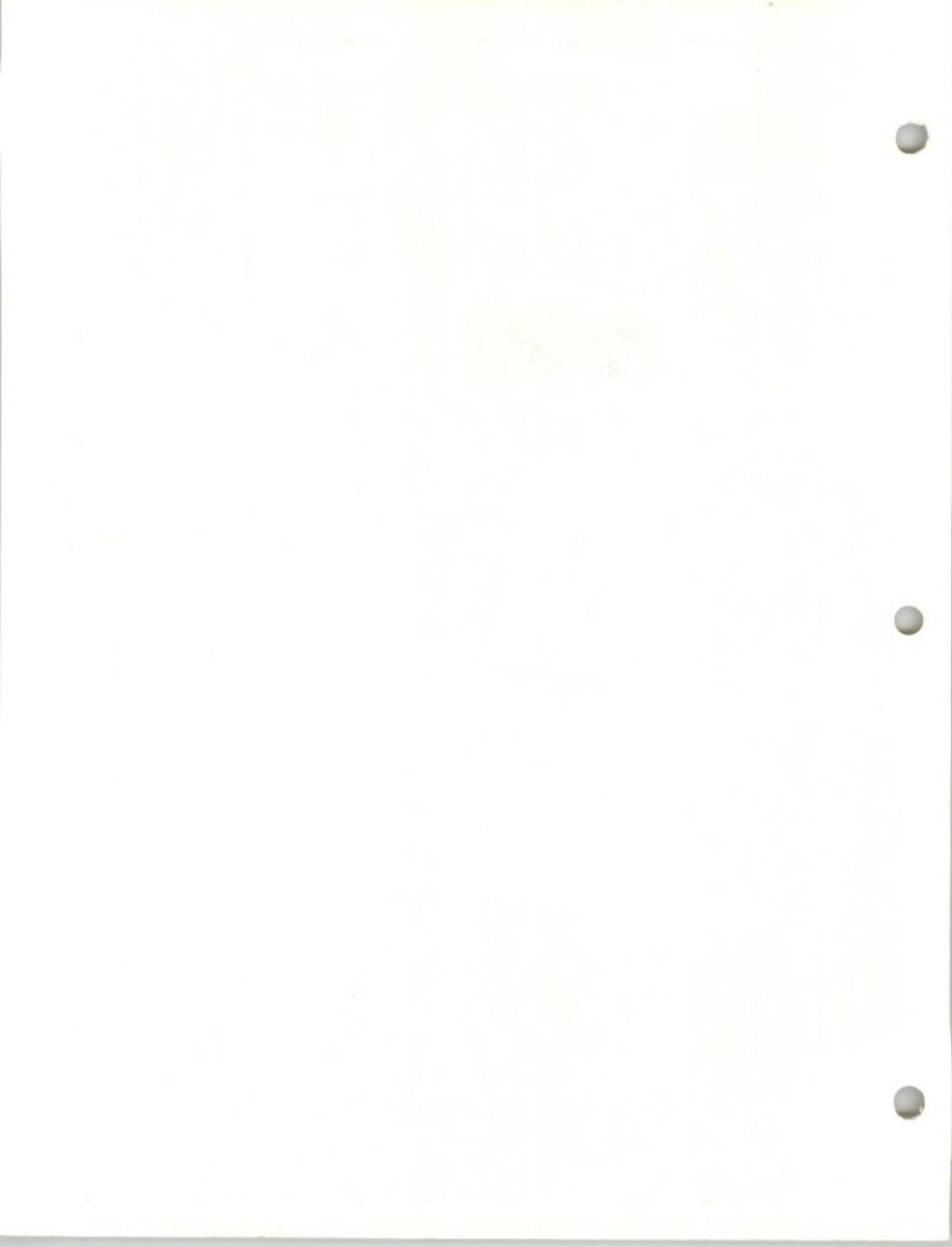
* POST AND PANEL(S) TO BE PLACED
SO THAT PANEL EDGE IS FLUSH
WITH FACE OF OBJECT NEAREST
TRAVELED WAY.

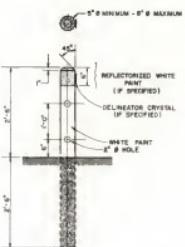
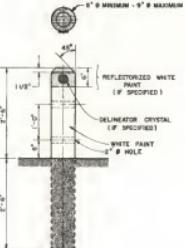
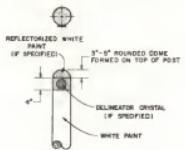
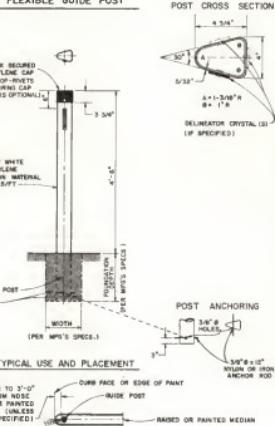
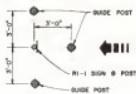
APPROVED
By *John D. Dobel*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 244

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
OBJECT MARKER DESIGN &
PLACEMENT DETAILS FOR OBSTRUCTIONS
ADJACENT TO OR WITHIN HIGHWAYS

REvised	10/8/78	
EFFECTIVE	1/1/78	



5" DIAMETER WOOD GUIDE POST**8" DIAMETER WOOD GUIDE POST****ALTERNATE TOP END FINISH FOR ROUND WOOD GUIDE POSTS****FLEXIBLE GUIDE POST****TYPICAL USE AND PLACEMENT****TYPICAL USE AND PLACEMENT****NOTES
WOOD GUIDE POSTS**

- WOOD GUIDE POSTS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THE STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION.
- THE PORTION OF THE WOOD GUIDE POST THAT IS TO BE IN THE GROUND SHALL BE TREATED FOR PROTECTION AS PER THE STANDARD SPECIFICATIONS.
- THE PORTION OF THE WOOD GUIDE POST THAT IS TO BE ABOVE GROUND SHALL BE PAINTED WITH TWO (2) COATS OF WHITE PAINT AS PER THE STANDARD SPECIFICATIONS.
- CONTRACTOR HAS CHOICE OF TOP END FINISH FOR WOOD GUIDE POSTS. ALL WOOD GUIDE POSTS FINISHED ON CONTRACTOR'S SHIPMENT SHALL HAVE THE SAME TOP END FINISH THROUGHOUT.
- REFLECTORIZATION OF WOOD GUIDE POSTS, IF REQUIRED IN PLAN SPECIFICATIONS, SHALL BE ACCOMPLISHED BY

1.5 COUNT/1' APPLIED WHITE REFLECTORIZED PAINT ON THE TOP (1" PORTION), MID OR THE INSTALLATION OF DELIMITATOR CRYSTALS AS SPECIFIED.

6. THE EXACT TYPE OF WOOD GUIDE POSTS TO BE USED, THEIR LOCATION, SHALL BE FOUND DETAILED IN THE SIGNING PLANS OF THE CONTRACT.

FLEXIBLE GUIDE POSTS

1. FLEXIBLE GUIDE POSTS SHALL CONFORM TO THE DESIGN AND SPECIFICATIONS DETAILED ON THIS SHEET.
2. FLEXIBLE GUIDE POSTS SHALL BE EMBEDDED TO THE MANUFACTURER-SPECIFIED FOUNDATION DEPTH WITH THEIR SPECIFIED FOUNDATION WIDTH USING THE POST ANCHORING DESIGN AS DETAILED.
3. THE HOLLOW POST PORTION TO BE IN THE GROUND SHALL BE BACKFILLED INSIDE WITH THE SAME MATERIAL AS THE

1.5 COUNT/1' FOUNDATION.

4. REFLECTORIZATION OF FLEXIBLE GUIDE POST, IF REQUIRED IN PLAN SPECIFICATIONS, SHALL BE ACCOMPLISHED BY THE ADDITION OF WOOD GUIDE CRYSTALS, EITHER 1'-0" x 7" OR 3" DIAMETER, OR BY ADDING A 3'-0" x 6" PIECE OF REFLECTIVE SHEETING (B) THE COLOR OF THE DELIMITATOR CRYSTALS OR REFLECTORIZED MATERIAL SHALL BE FOUND DETAILED IN THE SIGNING PLANS OF THE CONTRACT.
5. THE EXACT LOCATION AND PLACEMENT OF THE FLEXIBLE GUIDE POSTS SHALL BE FOUND DETAILED IN THE SIGNING PLANS.

■ ■ ■ • DIRECTION OF VEHICULAR TRAVEL

REVISED	07/04/04
EFFECTIVE	27/7/04

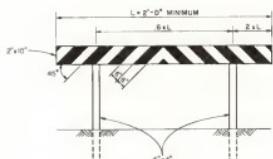
APPROVED
By *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 245

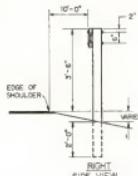
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GUIDE POST DESIGN AND
PLACEMENT DETAILS



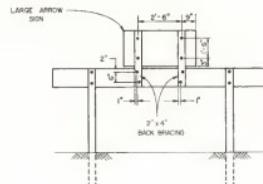
B(I) BARRICADE



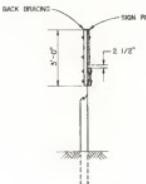
GENERAL BARRICADE DETAILS
B(I) I & B



RIGHT SIDE VIEW
EDGE OF SHOULDER



REAR VIEW
SIGN MOUNTING DETAILS



LEFT SIDE VIEW
SIGN PANEL
BACK BRACING

NOTES

1. ALL BARRICADES SHALL BE CONSTRUCTED OF COMPARISON GRADE 545 LUMBER. USE $\frac{3}{8}$ " CARRIAGE HEAD PLATED BOLTS, WASHERS, AND NUTS FOR ALL CONNECTIONS.

3. ALL BARRICADES SHALL HAVE ALTERNATING REFLECTIVE RED AND WHITE STRIPES AT AN ANGLE OF 45° WITH THE HORIZONTAL, SLOPING DOWNWARD TOWARD THE SIDE OF APPROACHING TRAFFIC TO FLOW NORMAL DIMENSIONS OF ROLL MATERIAL FOR TRAFFIC.

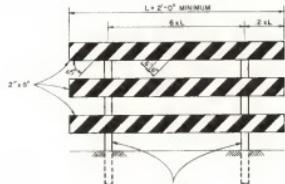
4. BARRICADES SHALL BE REFLECTORIZED WITH THE SHEETING MOUNTED ON A SHEET ALUMINUM BACKING AT LEAST 0.09" THICK ALUMINUM ALLOY 6061-T6 CONFORMING TO A.S.T.M. DESIGNATION B-201-76. OR USE EQUIVALENT ALUMINUM SHEETING SHALL BE SECURED WITH ALUMINUM NAILS.

5. POST LENGTH SHALL BE DETERMINED IN THE FIELD CORRECT WITH THE MOUNTING HEIGHTS AND FOUNDATION DEPTHS LISTED ON THE SHEET.

6. MOBILE BARRICADES SHALL BE CONSTRUCTED PER CONSTRUCTION STANDARD DRAWING NUMBER 210.

7. ALL POSTS NECESSARY TO CONSTRUCT AND INSTALL BARRICADES SHALL BE INCLUDED IN THE ITEM "BARRICADE TYPE, LIN. FT."

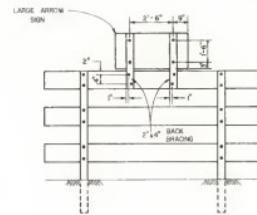
8. BARRICADES DESIGNATED "A" SHALL BE PLACED TO THE RIGHT SIDE OF APPROACHING TRAFFIC.



GENERAL BARRICADE DETAILS
B(I) II & B



RIGHT SIDE VIEW
EDGE OF SHOULDER



REAR VIEW
SIGN MOUNTING DETAILS



LEFT SIDE VIEW
SIGN PANEL
BACK BRACING

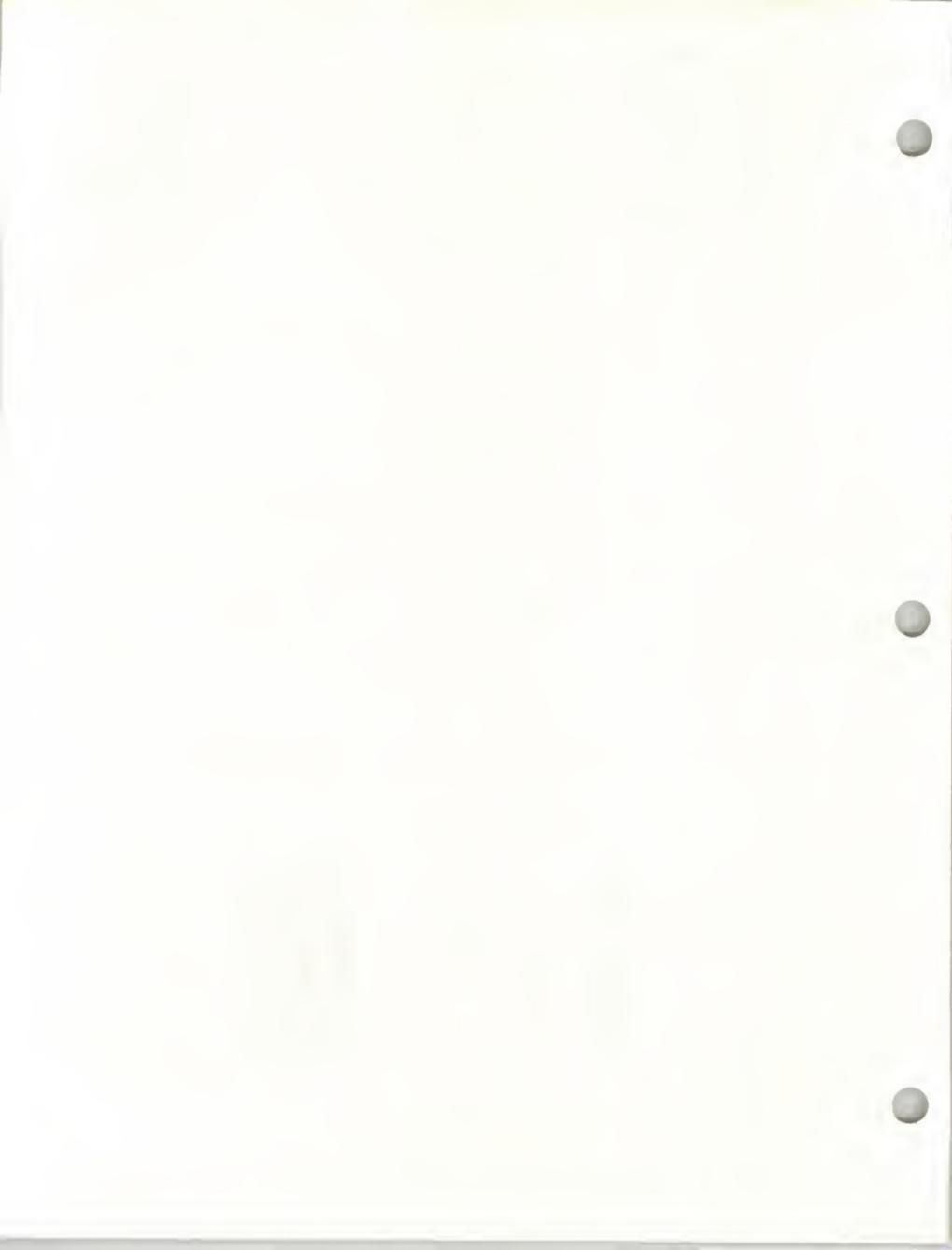
APPROVED
By *Jack P. Dahl*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 246.

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
PERMANENT BARRICADE
DESIGN DETAILS

REVISED	10/1/79	07/1/79
EFFECTIVE	2/1/78	07/1/79

B III BARRICADE





3"
6" UPPER CASE SERIES D
2"
4" UPPER CASE SERIES B
3"

S2-IS
36" X 18"
MARGIN = 1/2"
BORDER = 3/4"
CORNER RADIUS = 1 7/8"
BLACK LEGEND AND BORDER ON
REFLECTORIZED WHITE BACKGROUND



6" NUMERAL SERIES E
6" UPPER CASE SERIES C

SI-IS
36" X 12"
MARGIN = 1/2"
BORDER = 3/4"
CORNER RADIUS = 1 7/8"
BLACK LEGEND AND BORDER ON
REFLECTORIZED YELLOW BACKGROUND

NOTES

1. INFORMATION CONTAINED HEREIN IS VARIABLE
NOT THE LEGAL AUTHORITY FOR
PLACEMENT OF SCHOOL CROSSING
CONTROL DEVICES. THE DECISION TO
USE SUCH CONTROL DEVICES SHOULD
BE MADE ON THE BASIS OF A TRAFFIC
ENGINEERING INVESTIGATION.
2. THE S2-IS PANEL IS TO SUPPLEMENT
THE S2-I SIGN. THE SI-IS PANELS
ARE TO SUPPLEMENT THE SI-I SIGN.



6" NUMERAL SERIES C
8" X SERIES C
6" UPPER CASE SERIES C

SI-IS
36" X 12"
MARGIN = 1/2"
BORDER = 3/4"
CORNER RADIUS = 1 7/8"
BLACK LEGEND AND BORDER ON
REFLECTORIZED YELLOW BACKGROUND



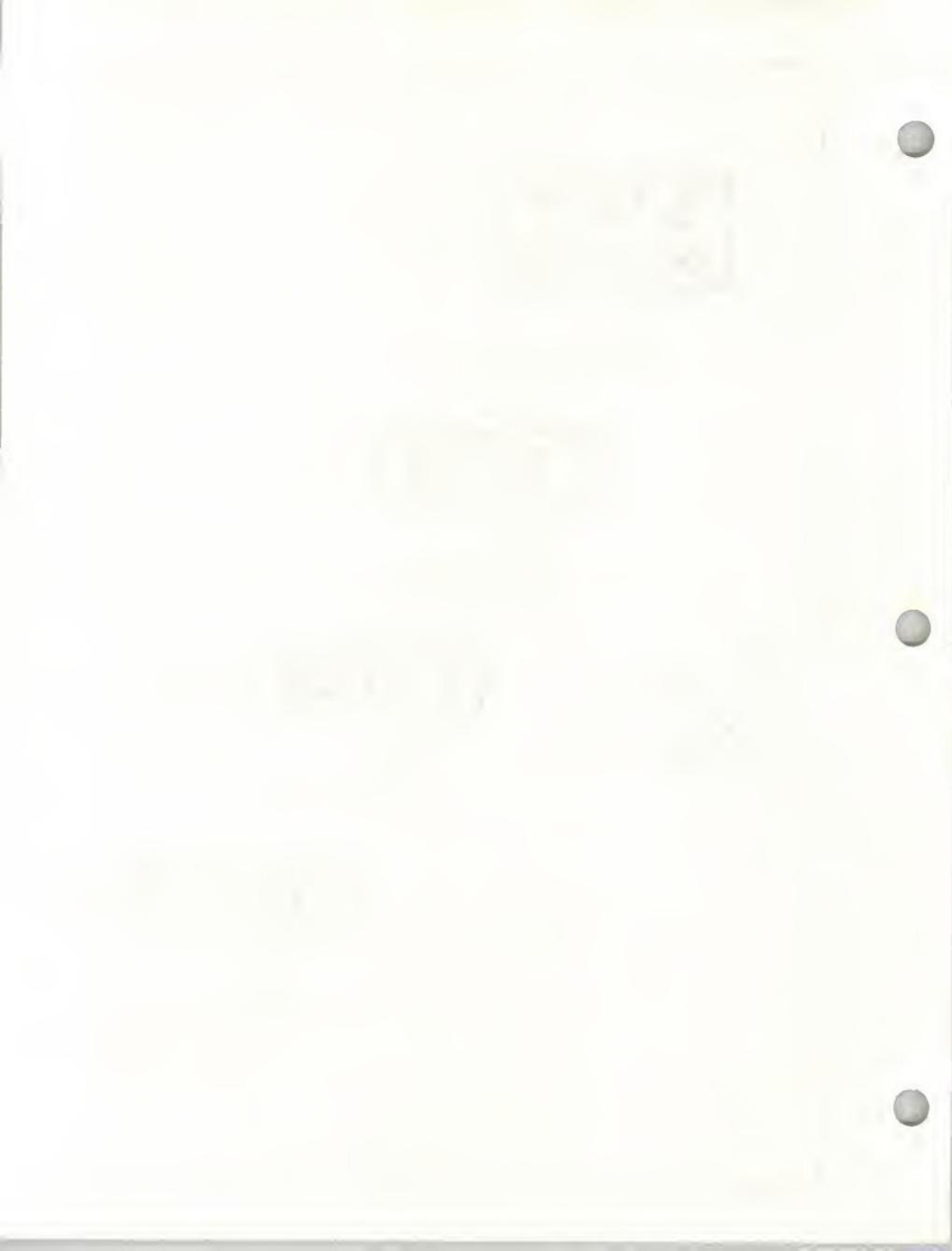
6" NUMERAL AND
6" UPPER CASE
SERIES D

SI-IS
36" X 12"
MARGIN = 1/2"
BORDER = 3/4"
CORNER RADIUS = 1 7/8"
BLACK LEGEND AND BORDER ON
REFLECTORIZED YELLOW BACKGROUND

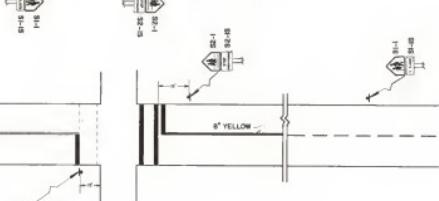
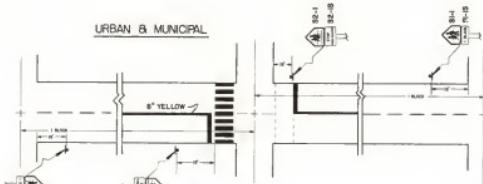
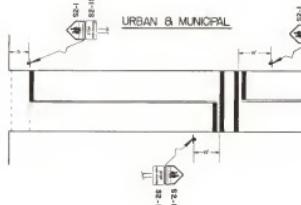
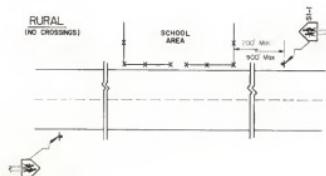
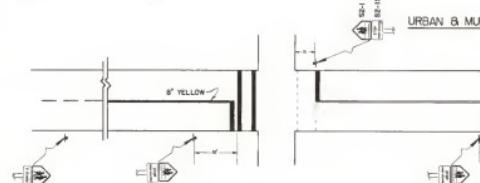
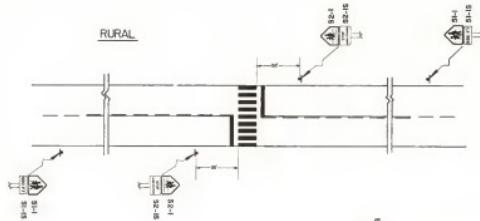
SIGNING STANDARD DRAWING NUMBER 251	
SCHOOL CROSSING SERIES - SUPPLEMENTAL SIGN DESIGN DETAILS	
APPROVED BY _____	ADMINISTRATOR-ENGINEERING DIVISION

REVISED	4/1/79
EFFECTIVE	4/1/79

APPROVED BY _____
ADMINISTRATOR-ENGINEERING DIVISION



PLACEMENT GUIDELINES



IMPORTANT NOTE

INFORMATION CONTAINED HEREIN IS FOR GENERAL COVERAGE PURPOSES ONLY, AND IS NOT THE LEGAL AUTHORITY FOR PLACEMENT OF SUCH SCHOOL CROSSING CONTROL DEVICES. THE DECISION TO USE SUCH CONTROL DEVICES SHOULD BE MADE ON THE BASIS OF A TRAFFIC ENGINEERING INVESTIGATION.

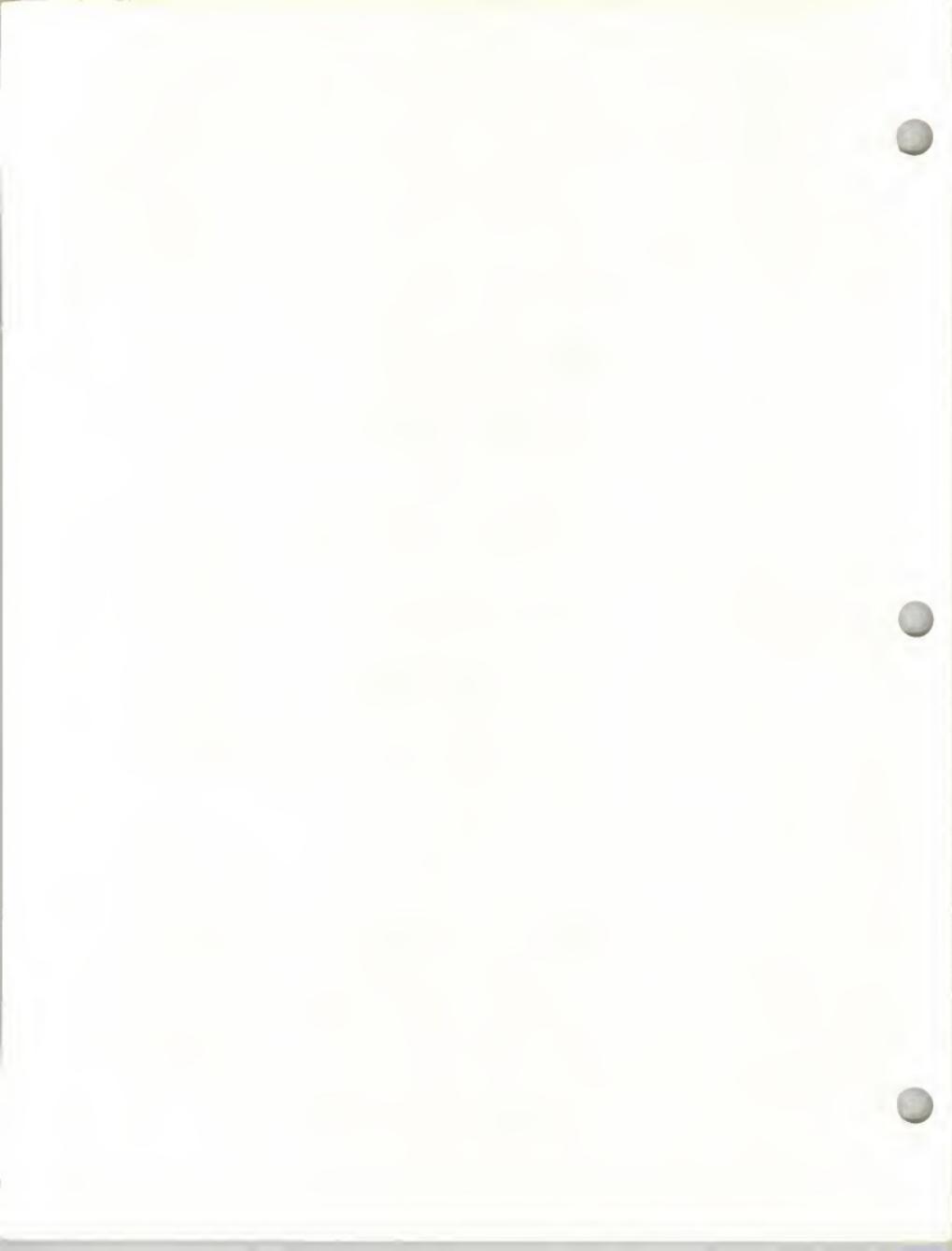
DRAWN BY 3-10-73 G.E.G.
CHECKED BY 3-10-73 (J.L.)

REVISED 10/7/78 6/1/79
EFFECTIVE 2/1/78 6/1/79

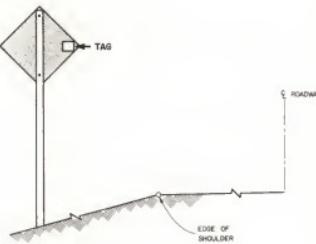
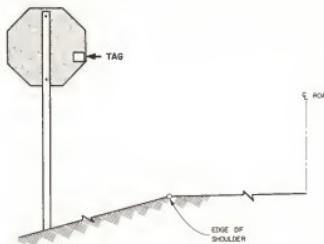
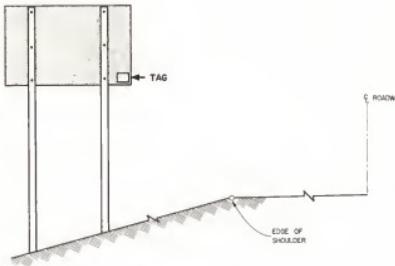
APPROVED
BY *Jack D. Raber*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 252

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SCHOOL CROSSING SERIES
SIGNING & PLACEMENT DETAILS



—INSTALLATION DATE TAGS— PLACEMENT DETAILS



NOTES:

1. In the case of a new Signing Project, the contractor shall place Installation Date Tags upon all signs before completion of the project. The cost for the labor to accomplish this task shall be included in the Sheet Aluminum and/or Aluminum Sheet Increment Items of the Contract. Tags are supplied by the state.
2. Tags shall also be placed upon any new sign which is installed in the field as routine maintenance.
3. The Tag shall display the year in which the sign was installed. The color for each years Tag shall be assigned at the beginning of the year by the Department of Highways Sign Shop in Helena, in order to make it easier to recognize the year of installation.
4. The Tag shall be placed upon the back of each sign, located near the lower corner of the sign nearest the edge of roadway, and shall be visible from the roadway as shown in the example(s) above.
5. The tags may be obtained from the Districts, either at the District Maintenance Office or the District Construction Office. The Tags are made and can be ordered from the Department's Sign Shop in Helena.

APPROVED
BY *Louis D. Baker*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 256

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
INSTALLATION DATE TAGS
PLACEMENT DETAILS

